

EVALUATION OF SELECTED  
BAT HABITAT SITES IN  
SOUTH-CENTRAL AND  
NORTHWESTERN MONTANA, 1995

Margaret L. Wolf  
San Diego State University  
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# TABLE OF CONTENTS

	<u>Page #</u>
TABLE OF CONTENTS .....	1
LIST OF APPENDICES .....	2
EXECUTIVE SUMMARY .....	3
INTRODUCTION .....	4
SURVEY METHODS .....	5
METHODS OF ANALYSIS .....	5
REFERENCES .....	7
AREA REPORTS	
SECTION A: PRYOR MOUNTAINS MINE RECLAMATION SITES	
SECTION B: OTHER PRYOR MOUNTAINS SITES	
SECTION C: RED LODGE COAL FIELD MINES	
SECTION D: KOOTENAI NATIONAL FOREST SITES	
SECTION E: RAVALLI MINE SITE	
APPENDICES	

## **LIST OF APPENDICES**

- I. SITE LOCATION MAPS
- II. ENTRANCE/ANABAT SITE LOCATION DATA
- III. CAVERN INVENTORY FORMS
- IV. PROCESSED ANABAT DATA PLOT SUMMARIES

## EXECUTIVE SUMMARY

This report presents the results of a field inventory of bat occurrence in south-central and northwestern Montana during 1995. Field work was conducted from July through late September at four different study areas (two in each region). The four areas investigated were 1) the Pryor Mountains in Carbon County, 2) the inactive coal mines in Carbon County between Red Lodge and Bearcreek, 3) the southern part of the Kootenai National Forest in Lincoln and Sanders Counties, and 4) the area of abandoned mines west of Ravalli in Sanders County.

Caves, abandoned mines and foraging sites were examined visually and/or sampled using ultrasonic detection equipment or mist nets or both. Where possible, temperature and humidity readings were recorded on maps of underground passages for evaluation as roost sites. Results are presented in four separate sections of the report. The Pryor Mountains section is split into two portions; one part covers a limited group of abandoned mines undergoing reclamation activities, the second part covers a combination of caves, unreclaimed mines and man-made workings, and potential bat foraging sites.

Results indicate a variety of bat species active in the areas inventoried. Species identified from recordings included *Antrozous pallidus*, *Eptesicus fuscus*, *Lasionycteris noctivagans*, *Lasiurus cinereus*, *Myotis evotis*, *Plecotus townsendii* and undifferentiated *Myotis* species. *Eptesicus fuscus*, *Lasionycteris noctivagans*, and *Lasiurus cinereus* usually do not use mines for day or maternity roosts, and none were found in mines or caves during the 1995 inventory. *Plecotus townsendii* was detected in all areas except the coal mines of the Bearcreek District; *Antrozous pallidus* was detected only in the Pryor Mountains.

Inventory results verified that adits provide valuable habitat for sensitive bat species, particularly in areas where natural shelter is scarce; these "artificial caves" also provide supplemental sites for bats displaced by disturbance or natural events. Use of specific mines and caves for day or maternity roosts, or hibernacula remains speculative in many cases, however, and deserves further study.

## INTRODUCTION

Knowledge of Montana's bat fauna is fragmentary. The most recent summary of bat distribution and habitat use in the state (Hoffmann and Pattie 1968, Hoffmann et al. 1969) has since been supplemented with the addition of two new species (see Swenson and Shanks 1979, Shryer and Flath 1980) and several regional surveys (e.g., Jones et al. 1973, Swenson and Bent 1977, Worthington and Ross 1990, Worthington 1991, Roemer 1994, Hendricks 1995a, 1995b). Nevertheless, site surveys have often been brief (lacking the thoroughness of an intensive study), and many areas in Montana remain unsurveyed. Thus, much remains to be learned about the distribution, abundance, seasonal movements, and reproductive biology of bat species in the state.

Nine species of bats found in Montana are on the Montana Natural Heritage Program list of "Animal Species of Special Concern", seven of which are also listed by the U.S. Fish & Wildlife Service as candidates (C2) for threatened or endangered status. Candidate species include *Myotis yumanensis*, *M. evotis*, *M. thysanodes*, *M. volans*, *M. ciliolabrum*, *Euderma maculatum*, and *Plecotus townsendii*; the last two species are also listed by the U.S. Forest Service as Sensitive. All of the C2 species, with the exception of *Euderma maculatum*, use caves and mines during some portion of their annual cycle. The remaining two species on the Heritage Program list, *Myotis septentrionalis* and *Antrozous pallidus*, have limited distributions in Montana but also use caves and mines for roosts or hibernacula. Three additional, unlisted species of bats in Montana use caves or mines. Thus, 11 (79%) of 14 bat species in Montana rely primarily on caves or mines for roost or hibernaculum sites.

Several species of North American cave-dwelling bats have been adversely affected in recent decades by a variety of human-induced environmental changes to caves, including cave closures, impoundments, and vandalism or other human disturbances (e.g., Humphrey 1978, Tuttle 1979, LaVal and LaVal 1980). These, and landscape changes such as deforestation and agricultural development, have forced many bats to abandon traditional sites in search of new roosts and hibernacula; as a result, some cave-dwelling species in the East and Midwest have been federally listed as threatened or endangered. Mines offer a variety of subterranean microclimates similar to those in natural caves (Tuttle and Stevenson 1978, Tuttle and Taylor 1994) and can provide suitable habitat for roosting and hibernating bats. In fact, abandoned mines now serve as principal roosts and hibernacula for many cave-dwelling species (Tuttle and Taylor 1994), and are important for populations occupying marginal habitats (Gates et al. 1984) in areas where there are continued threats to primary natural roosts.

Mine-reclamation (including closure to restrict human access) is of interest to wildlife managers because reclamation activities can have significant negative impacts on bat populations (e.g., Richter et al. 1993), unless closure is done in such a way as to minimize disturbance to bats in the mines affected. Because the majority of bat species in Montana use caves and mines, it is especially important to determine the magnitude of mine use by bats in the state and identify situations where abandoned mines can be made safe for humans while maintaining their attractiveness to bats.

Assessing and mitigating the potential impact of mine reclamation on bats requires inventory of bat presence in and around mines being considered for reclamation activity. Inventories for bats were completed in 1995 for five groups of mine sites located in four separate areas of Montana: 1) two groups of sites in the Pryor Mountains in Carbon County, 2) the Redlodge-Bearcreek coal mines in Carbon County, 3) the mine area west of Ravalli in Sanders County, 4) the southern part of the Kootenai National Forest in Sanders and Lincoln Counties. Emphasis was placed on bat use of abandoned mines, but caves and foraging sites were also surveyed in some places. Bats have been reported previously in all four areas (see Worthington and Ross 1990, Worthington 1991 for the Pryor Mountains; Hoffmann et al. 1969 for the Ravalli area; Roemer 1994, Hendricks et al. 1995b for the Kootenai National Forest. Reports from the Redlodge coal fields are personal communications).

This study of bat distribution will serve two purposes. First, it will assist in evaluating options for closure of abandoned mines. Second, it will help expand the base of knowledge available on the distribution of bats in Montana. Expanded knowledge of bat distribution and behavior is needed to make intelligent management decisions, where the impact of modifying mines and caves on their biological components is given equal consideration with the magnitude of the hazards that mines and caves pose to humans.

## SURVEY METHODS

Methods for sampling bats in the field are well established (see Kunz and Kurta 1988, Thomas and West 1989). A combination of mist-nets, ultrasound detectors, and visual inspections was used during the 1995 field season to detect and identify bats in the study areas. For the first method, one or two mist nets were deployed at a single site each night, as weather permitted, in an attempt to capture flying individuals. Mist-netting has the advantage of allowing in-hand identification of individuals and collection of data on sex and reproductive condition. Some bats may not get captured, however, and species present at a particular site may go undetected. For the second method, four to six ultrasound bat detectors were deployed each night at different locations to maximize geographic coverage and record activity at several individual sites. Ultrasound detectors can determine the presence of species that may be missed during netting, but identification of species-specific calls is complicated by intraspecific variation in call duration, structure, and frequency (Fenton and Bell 1981, Thomas et al. 1987, Brigham et al. 1989, Erickson 1993), requiring considerable experience and training in call interpretation. In addition, most species of *Myotis* cannot be reliably segregated by their calls (K. Jurist pers. comm., but see Fenton et al. 1983). Ideally, then, a combination of mist nets and bat detectors should be employed at a given site to obtain the most accurate picture of bat presence. As a supplement to netting and electronic detection, visual inspections of potential roost sites were made in those caverns or buildings stable enough to enter safely. Keys were available for identification of bats captured and examined in hand (see MDHES 1981; van Zyll de Jong 1985).

Several brands of electronic bat detectors are currently available. ANABAT II bat detectors (Titley Electronics, Ballina, Australia) were used during the 1995 field season. The portability and reliability of these systems make them extremely valuable for work in remote sites, in situations where time is limited and many sites need to be sampled, or where field personnel are minimal in number. For this study, detector units (consisting of the detector, a timer/tape-driver, and a cassette tape recorder) were set up before dusk at selected sites where bats were expected or where knowledge of bat use was desired. For mine adits or caves the unit was usually situated to record only bats inside or very near the entrance. In some cases the detectors were placed to record over bodies of water or in open areas near forest edges, where bat activity would be expected. Calls recorded during the night were stored on cassette tapes for later analysis. After sunrise the units were retrieved, recharged and serviced during daylight hours.

To supplement the data on bat activity, a standard set of physical characteristics describing each site was recorded on field inventory and ANABAT data forms. Copies of cavern or mine inventory forms, showing the variables recorded, are in Appendix III. ANABAT data forms completed in the field are available for inspection at the Helena office of the Natural Heritage Program; Appendix IV contains analytical summaries for each ANABAT site recording.

To supplement the electronic recordings, direct observations were made in those caverns stable enough to enter safely. Results of those inspections are included in the field inventory forms (Appendix III). Underground inspections were necessarily brief and somewhat cursory, since safety was the overriding concern. In keeping with methods established by national cave research organizations, extra sources of light and first aid equipment were always available while working underground. Lack of stand-by personnel greatly limited the completeness of the underground searches, particularly in the abandoned mines.

## ANALYSIS OF BAT VOCALIZATIONS

Species-specific calls recorded by the ANABAT units cannot easily be interpreted in the field. ANABAT II detectors capture bat calls in the range of 20-180 kHz and convert them to an audible frequency some constant fraction of the original frequency. The new signal is recorded on magnetic tape and transported to the lab for analysis on a personal computer. The recordings are played through an ANABAT II ZCA



Interface Module and stored as graphics files by the ANABAT software. Calls are then identified by comparison to reference calls recorded from captured specimens or published characteristics recorded by others.

Using the Titley ANABAT system, bat calls are converted to square-wave time-frequency plots rather than direct analog curves. Amplitude and subtle characteristics of the echo-location signals are lost, but details unique to each species are preserved. Time-frequency plots produced by the ANABAT software can easily be printed for future reference or stored in computer graphics files. Plots produced from recordings made during this study are available for inspection at the Natural Heritage Program office in Helena.

## REFERENCES

- Brigham, R. M., J. E. Cebek, and M. B. C. Hickey. 1989. Intraspecific variation in the echolocation calls of two species of insectivorous bats. *J. Mamm.* 70:426-428.
- Campbell, N. P. 1978. Caves of Montana. Montana Bureau of Mines and Geology Bull. No. 105, Montana College of Mineral Science and Technology. Butte, MT. 169 pp.
- Erickson, J. L. 1993. Bat activity in managed forests of the southwestern Cascade Range. Master's Thesis, Univ. Washington. 66 pp.
- Fenton, M. B., and G. P. Bell. 1981. Recognition of species of insectivorous bats by their echolocation calls. *J. Mamm.* 62:233-243.
- Fenton, M. B., H. G. Merriam, and G. L. Holroyd. 1983. Bats of Kootenay, Glacier, and Mount Revelstoke national parks in Canada: identification by echolocation calls, distribution, and biology. *Can. J. Zool.* 61:2503-2508.
- Gates, J. E., G. A. Feldhamer, L. A. Griffith, and R. L. Raesly. 1984. Status of cave-dwelling bats in Maryland: importance of marginal habitats. *Wildl. Soc. Bull.* 12:162-169.
- Hendricks, P., K. A. Jurist, D. L. Genter, and J. D. Reichel. 1995a. Bat survey of the Sioux District, Custer National Forest: 1994. Montana Natural Heritage Program. Helena, MT. 41 pp.
- Hendricks, P., K. A. Jurist, D. L. Genter, and J. D. Reichel. 1995b. Bat survey of the Kootenai National Forest, Montana: 1994. Montana Natural Heritage Program. Helena, MT. 48 pp.
- Hoffmann, R. S., and D. L. Pattie. 1968. A guide to Montana mammals. Univ. Mont. Print. Serv. Missoula, MT. 133 pp.
- Hoffmann, R. S., D. L. Pattie, and J. F. Bell. 1969. The distribution of some mammals in Montana. II. Bats. *J. Mamm.* 50:737-74.
- Humphrey, S. R. 1978. Status, winter habitat, and management of the endangered Indiana bat, *Myotis sodalis*. *Florida Sci.* 41:65-76.
- Jones, J. K., Jr., R. P. Lampe, C. A. Spenrath, and T. H. Kunz. 1973. Notes on the distribution and natural history of bats in southeastern Montana. *Occ. Pap. Mus. Texas Tech Univ.* No. 15. 12 pp.
- Kunz, T. H., and A. Kurta. 1988. Capture methods and holding devices. Pp. 1-29, in *Ecological and behavioral methods for the study of bats*, (T. H. Kunz, ed.). Smithsonian Institution Press, Washington, D.C.
- LaVal, R. K., and M. L. LaVal. 1980. Ecological studies and management of Missouri bats, with emphasis on cave-dwelling species. *Missouri Dept. Cons. Terr. Ser. No. 8.* 53 pp.
- Madson, M., G. Hanson, S. Martinez, and D. Genter. 1993. Wintering bats in Montana: results of surveys in the Pryor Mountains with annotation on area caves and mines. Montana Natural Heritage Program. Helena, Montana.
- Montana Department of Health and Environmental Sciences (MDHES). 1981. Montana bats, Part II: identification and biology. MDHES, Food and Consumer Safety Bureau, Vector Control Bulletin No. 2A, 10 pp.
- Richter, A. R., S. R. Humphrey, J. B. Cope, and V. Brack, Jr. 1993. Modified cave entrances: thermal effect on body mass and resulting decline of endangered Indiana bats (*Myotis sodalis*). *Cons. Biol.* 7:407-415.
- Roemer, D. M. 1994. Results of field surveys for bats on the Kootenai National Forest and the Lolo National Forest of western Montana, 1993. Montana Natural Heritage Program. Helena, MT. 19 pp.
- Shryer, J., and D. L. Flath. 1980. First record of the pallid bat (*Antrozous pallidus*) from Montana. *Great Basin Nat.* 40:115.
- Swenson, J. E., and J. C. Bent. 1977. The bats of Yellowstone County, southcentral Montana. *Proc. Mont. Acad. Sci.* 37:82-84.
- Swenson, J. E., and G. F. Shanks, Jr. 1979. Noteworthy records of bats from northeastern Montana. *J. Mamm.* 60:650-652.
- D. W. Thomas, G. P. Bell, and M. B. Fenton. 1987. Variation in echolocation call frequencies in North American vespertilionids. *J. Mamm.* 68:842-847.
- Thomas, D. W., and S. D. West. 1989. Sampling methods for bats. Gen. Tech. Rep. PNW-GTR-243.

- Portland, OR: U.S. Dept. Agri., Forest Serv., Pacific Northwest Res. Stn. 20 pp. (Ruggiero, L. F., and A. B. Carey, tech. eds.; Wildlife-habitat relationships: sampling procedures for Pacific Northwest vertebrates).
- Tuttle, M. D. 1979. Status, causes of decline, and management of endangered gray bats. *J. Wildl. Manage.* 43:1-17.
- Tuttle, M. D., and D. E. Stevenson. 1978. Variation in the cave environment and its biological implications. Pp. 108-121 *in* 1977 National cave management symposium proceedings (R. Zuber, J. Chester, S. Gilbert, and D. Rhodes, eds.). Adobe Press. Albuquerque, NM. 140 pp.
- Tuttle, M. D., and D. A. R. Taylor. 1994. Bats and mines. *Bat Cons. Internatl. Resource Pub. No. 3.* 42 pp.
- van Zyll de Jong, C. G.. 1985. Handbook of Canadian mammals, vol.2: Bats. National Museums of Canada, National Museum of Natural Sciences. Ottawa, Canada. 212 pp.
- Worthington, D. J., and H. N. Ross. 1990. Abundance and distribution of bats in the Pryor Mountains of south central Montana. Montana Natural Heritage Program. Helena, Montana. 20 pp.
- Worthington, D. J. 1991. Abundance and distribution of bats in the Pryor Mountains of south central Montana and north eastern Wyoming. Montana Natural Heritage Program. Helena, Montana. 23 pp.

## RESULTS

The different species of bats reported to occur historically in Montana are summarized in Table 1. Six of the listed species (*Antrozous pallidus*, *Eptesicus fuscus*, *Lasionycteris noctivagans*, *Lasiurus cinereus*, *Myotis evotis*, *Plecotus townsendii*) were detected during the 1995 survey. Undifferentiated *Myotis* were detected at many of the sites in all of the study areas except the Ravalli mine site.

TABLE 1  
LIST OF BATS FOUND IN MONTANA <sup>(1)</sup>

Scientific Name	Common Name
<i>Antrozous pallidus</i>	Pallid Bat
<i>Eptesicus fuscus</i>	Big Brown Bat
<i>Euderma maculatum</i>	Spotted Bat
<i>Lasionycteris noctivagans</i>	Silver-Haired Bat
<i>Lasiurus cinereus</i>	Hoary Bat
<i>Myotis californicus</i>	California Myotis
<i>Myotis ciliolabrum (leibii)</i>	Western Small-Footed Myotis
<i>Myotis evotis</i>	Long-Eared Myotis
<i>Myotis lucifugus</i>	Little Brown Myotis
<i>Myotis septentrionalis (keenii)</i>	Keen's Myotis
<i>Myotis thysanodes</i>	Fringed Myotis
<i>Myotis volans</i>	Long-Legged Myotis
<i>Myotis yumanensis</i>	Yuma Myotis
<i>Plecotus townsendii</i>	Townsend's Big-Eared Bat

<sup>(1)</sup> Data from Montana Natural Heritage Program.

Previous studies have documented six bat species in caverns of the Pryor Mountains. The species observed were *Eptesicus fuscus*, *Myotis evotis*, *M. volans*, *M. lucifugus*, *M. ciliolabrum*, and *Plecotus townsendii* (Worthington and Ross 1990, Worthington 1991). *Antrozous pallidus*, first reported in Montana from the Pryor Mountains area (Shryer and Flath 1980), has not been detected previously in caves or mines in this area. Five species of cave-dwelling bats, including *A. pallidus*, *M. evotis*, and *P. townsendii*, were found in and around mines and caves in this area during 1995.

Nine bat species (*M. californicus*, *M. ciliolabrum*, *M. evotis*, *M. lucifugus*, *M. volans*, *L. noctivagans*, *E. fuscus*, *L. cinereus*, *P. townsendii*) have been reported previously from the Kootenai National Forest (Roemer 1994, Hendricks et al. 1995) although none of the records are from caves or mines. Four species of cave-dwelling bats, including *P. townsendii*, were found in and around mines in this area in 1995.

There is no previous written documentation of bat use of caves or mines in the Ravalli and Red Lodge-Bearcreek areas. One (*P. townsendii*) and two (*E. fuscus* and *Myotis* sp.) cave-dwelling bat species, respectively, were found in and around mines in these areas during 1995.

The following area reports provide details on bat activity at specific sites in each study area, and include evaluation of the potential at each site for future bat use. In some cases, gating is a recommended method

of mitigating the need for protecting humans from the hazards of abandoned mines while maintaining the site as a potential roost or hibernaculum for bats. There are several sources discussing the design of bat gates for mines and caves, and the effects that gating may have on bats if done improperly. Useful discussions can be found in LaVal and LaVal (1980), White and Seginak (1987), Richter et al. (1993), Tuttle and Taylor (1994), Dalton and Dalton (1995), and references cited in each.

## REFERENCES

- Dalton, D. C., and V. M. Dalton. 1995. Mine closure methods including a recommended gate design. Pp. 130- 135, in Riddle, B. R. (ed.). 1995. Inactive mines as bat habitat: guidelines for research, survey, monitoring and mine management in Nevada. Biological Resources Research Center, Univ. Nev, Reno.
- Hendricks, P., K. A. Jurist, D. L. Genter, and J. D. Reichel. 1995. Bat survey of the Kootenai National Forest, Montana: 1994. Montana Natural Heritage Program. Helena, MT. 48 pp.
- LaVal, R. K., and M. L. LaVal. 1980. Ecological studies and management of Missouri bats, with emphasis on cave-dwelling species. Missouri Dept. Cons., Terrestrial Ser. No. 8. 53 pp.
- Richter, A. R., S. R. Humphrey, J. B. Cope, and V. Brack, Jr. 1993. Modified cave entrances: thermal effect on body mass and resulting decline of endangered Indiana bats (*Myotis sodalis*). Cons. Biol. 7:407-415.
- Roemer, D. M. 1994. Results of field surveys for bats on the Kootenai National Forest and Lolo National Forest of western Montana, 1993. Montana Natural Heritage Program. Helena, MT. 19 pp.
- Shryer, J., and D. L. Flath. 1980. First record of the pallid bat (*Antrozous pallidus*) from Montana. Great Basin Nat. 40:115.
- Tuttle, M. D., and D. A. R. Taylor. 1994. Bats and mines. Bat Cons. Internatl. Resource Pub. No. 3. 42 pp.
- White, D. H., and J. T. Seginak. 1987. Cave gate designs for use in protecting endangered bats. Wildl. Soc. Bull. 15:445-449.
- Worthington, D. J. 1991. Abundance and distribution of bats in the Pryor Mountains of south central Montana and north eastern Wyoming. Montana Natural Heritage Program. Helena, MT. 23 pp.
- Worthington, D. J., and H. N. Ross. 1990. Abundance and distribution of bats in the Pryor Mountains of south central Montana. Montana Natural Heritage Program. Helena, MT. 20 pp.

## AREA REPORTS

### SECTION A: PRYOR MOUNTAINS MINES RECLAMATION SITES

These abandoned mines are located just inside the south boundary of the Custer National Forest, Beartooth Division, or south of the boundary on land controlled by the US Bureau of Land Management in Carbon County, Montana. Many of the adits are being considered for reclamation or have undergone some limited reclamation (Spectrum Engineering 1989, 1990, 1994). There are many other prospects and adits in the area which were not studied because of time constraints.

Mines in the Pryor Mountains primarily exploited uranium deposits and began operations in the mid-50's (Hauptman 1956, Stout 1956, Stout and Ackerman 1958, 1959). Mining developed quickly in the area of the Pryor Mountains and involved several different mining or exploration companies. Lucrative incentives offered by the Federal government for uranium ore did much to promote the rapid development of deposits in the area. Most of the incentives ended around 1960 and afterward mining activity quickly declined. A few of the mines continued limited operations until 1963. Since that time the claims have been dormant or in a state of perpetual readiness, anticipating increased demand at some future date.

Bat habitat in these mines is limited. Few adits extend more than a few yards underground and by far the majority of available sites consist of little more than prospect pits or scrapes. There are a handful of exceptions which deserve mention. These include three of the Dandy Mine adits, the Marie adit, the CM&M East adit, the Lisbon Point West adit, the Sandra Mine and the Old Glory Mine adits. Serious accidents have not been reported at any of these sites, but as the condition of the adits deteriorates the potential for danger becomes more difficult to dismiss.

The habitat opportunity these mines create for bats is significant, even though the number of attractive sites is small. For adits extensive enough to maintain a stable environment throughout the year, valuable shelter is provided from the harsh climatic changes commonly experienced in Montana. The isolated location of the mine sites helps further to prevent frequent disturbances by visitors, encouraging sensitive species to return and use these sites each year.

ANABAT recordings indicated that *Plecotus townsendii* do use some of these adits. Table A1 summarizes the results of the ANABAT recordings from those sites monitored in 1995. Other sites were visited and evaluated for bat potential based on direct observation and previous experience in this area. Results of those evaluations are presented in Table A2.

**TABLE A1**  
**ANABAT RECORDING SUMMARY OF PRYOR MOUNTAINS MINES**

Site Name	Bat Abundance	Notes
CM&M Pit East	Low	<i>Myotis sp.</i> detected
CM&M West Adit	None	NO CALLS RECORDED
Dandy Mine - West Upper, Adit 4	High	Numerous <i>Antrozous pallidus</i>
Dandy Mine - West Upper, Adit 5	High	14 <i>Plecotus townsendii</i> , 7 <i>Myotis sp.</i> 1 <i>Eptesicus fuscus</i> and numerous <i>Antrozous pallidus</i>
Dandy Mine - West Lower, Adit 6	Moderate	2 <i>Plecotus townsendii</i> 5 <i>Myotis sp.</i> and multiple <i>Antrozous pallidus</i>
Lisbon Point East Adit	None	NO CALLS RECORDED
Lisbon Point West Adit	Moderate	Multiple <i>Antrozous pallidus</i>
Marie Mine Adit	Moderate	Numerous <i>Antrozous pallidus</i> and 2 <i>Myotis sp.</i>
Old Glory Mine (Ponderosa)	Moderate	Multiple <i>Antrozous pallidus</i>
Robert's Incline	Low	NO CALLS RECORDED
Sandra Mine	Low	3 possible <i>Antrozous pallidus</i> or perhaps undifferentiated <i>Myotis spp.</i>
Swamp Frog Mine - Central 1 area adit	Moderate	1 <i>Antrozous pallidus</i> , 1 probable <i>Plecotus townsendii</i> , and 6 undifferentiated <i>Myotis spp.</i>
Swamp Frog Mine - Northwest area	Low	Numerous undifferentiated <i>Myotis spp.</i>

**TABLE A2**  
**RECONNAISSANCE EVALUATION OF PRYOR MOUNTAINS MINES**

Site Name	Bat Use Potential	Observations
<b>Sites Proposed for Reclamation</b>		
CM&M Pit - CM&M Pit East	Moderate	Only a few myotis recorded but over 250' of 8' high passage available.
- CM&M West Adit	Low	Unrestricted circulation and short passage length make this an unattractive roost site, although bats were seen flying outside nearby.
Dandy Mine - West Upper, Adits 4 & 5	High	Good passage characteristics; attractive roost sites available.
- West Lower, Adit 6	High	Good passage characteristics; attractive roost sites available.
- East	None	Adit collapsed.
- Central	Low	Short adit
- South	Low	Short adit, no bat signs.
- Southeast	Low	Short adits or open excavations; limited shelter.
Lisbon Point - East	Low	Limited protection; small passage size; no bats or bat sign.
- West	Moderate	Limited protection; small passage size; no bats or bat sign.
Marie - Adit	High	Good roosting conditions; large extensive passages in multi-levels.
<b>Sites Where Reclamation is Partial or Complete</b>		
Old Glory Mine (Ponderosa)	Moderate	Open passages, 8' ceiling heights and domed areas provide favorable roosting opportunities; extensive passages lead from two available portals.
Roberts Incline - Adit	High	Good roosting conditions; > 200' of passages; 8'x 8' average passage size.
Sandra Mine	Moderate	Large, stable passageways with good roosting opportunities; dome areas with favorable temperatures.
Swamp Frog - Northwest	None	Adits sealed and area reclaimed; no passages.
- Central 1	Moderate	An adit ~ 85 feet long; high ceiling; good roosting spots.
- Central 2	None	No passages
- Central 3	Low	Shelter limited; no passageways outside twilight zone.
- South	None	Insufficient shelter and passage length
- East 1	None	Insufficient shelter and passage length
- East 2	None	No passage



Site Name	Bat Use Potential	Observations
- Southeast	None	No remaining shelter
Wild Horse Sites - Adits 1 through 5	None	Openings backfilled; No passages; No shelter remains.

## RECOMMENDATIONS

Presence of *Plecotus Townsendii* was confirmed in the major adits of the Dandy Mine, identified as nos. 4, 5 and 6 (Spectrum Engineering 1990). These adits deserve special consideration to preserve habitat for this threatened species. Although no *Plecotus* were recorded at Adit 4, its proximity to Adit 5 makes it a likely *Plecotus* site. Of the remaining adits of this group, the Marie Mine Adit and Lisbon Point West Adit could provide additional roosting sites and may receive some use at other times of the year. Temperature readings in these adits, sizeable passage and attractive roosting opportunities provide favorable conditions for the Western Big-Eared Bat (Hensley & Scott 1995).

The adits mentioned above are only marginally stable physically. They all show signs of minor collapse and dome development in some sections of passage. In spite of this, litter and garbage in the Dandy and Marie adits indicate that social parties take place occasionally, and fire circles in or near the portals demonstrate a dangerous misuse of the resource.

To help preserve the current level of use by sensitive species and provide alternate locations in the event of disturbance, gating rather than backfill or sealing would be the preferred alternative for the Dandy adits 4, 5 and 6, the Marie adit, Lisbon Point West adit and CM&M East adit. Should further consideration for closure be extended to those abandoned mines inside the Custer National Forest, the Old Glory Mine adits and the Sandra would also be recommended for gating. Although *Plecotus* were not detected at some of these sites, temperature and physical characteristics are such that they may be found there at other times of the year.

## REFERENCES - SECTION A

- Crowley, F. A. 1960. Directory of known mining enterprises, 1959, Montana Bureau of Mines and Geology Bulletin 14, Butte, Montana.
- Crowley, F. A. 1961. Directory of known mining enterprises, 1960, Montana Bureau of Mines and Geology Bulletin 20, Butte, Montana.
- Crowley, F. A. 1962. Directory of known mining enterprises, 1961, Montana Bureau of Mines and Geology Bulletin 25, Butte, Montana.
- Geach, R. D. 1966. Directory of mining enterprises for 1965, Montana Bureau of Mines and Geology Bulletin 49, Butte, Montana.
- Geach, R. D. 1967. Directory of mining enterprises for 1966, Montana Bureau of Mines and Geology Bulletin 58, Butte, Montana.
- Hauptman, C. M. 1956. Uranium in the Pryor Mountain area of southern Montana and Northern Wyoming, Uranium Magazine, vol.3, No.11, November 1956, pp.14-21.
- Hensley, S., and C. Scott. 1995. Ozark big-eared bat (*Plecotus townsendii ingens* [Handley]) Revised Recovery Plan, U.S. Fish and Wildlife Service, February 1995, Tulsa, OK.
- Jarrard, L. D. 1957. Some occurrences of uranium and thorium in Montana, Montana Bureau of Mines and Geology Miscellaneous Contribution No.15, Montana Bureau of Mines and Geology, Butte, Montana.
- Spectrum Engineering. 1989. Final report, Wild Horse Project, Carbon County, Montana, MT A/E 88-46-119, August 1, 1989.
- Spectrum Engineering. 1990. Final report, Pryor Mountain 89, Carbon County, Montana, MT A/E 88-46-119, January 25, 1990.
- Spectrum Engineering. 1994. Preliminary materials, Pryor Mountain 94, Carbon County, Montana, Mt A/E 88-46-119, August 1, 1989.
- Stout, K. 1956. List of known mining enterprises - 1956, Montana Bureau of Mines and Geology, Information Circular 14, Butte, Montana.
- Stout, K., and W. Ackerman. 1958. List of known mining enterprises - 1957, Montana Bureau of Mines and Geology, Information Circular 20, Butte, Montana.
- Stout, K., and W. Ackerman. 1959. List of known mining enterprises - 1958, Montana Bureau of Mines and Geology Bulletin 10, Butte, Montana.

## SECTION B: OTHER PRYOR MOUNTAINS SITES

The sites considered in this section are located in or near the Beartooth Division of the Custer National Forest, the Pryor Mountains National Wild Horse Range or near the Crow Indian Reservation in Carbon or Big Horn Counties, Montana. Many sites are located on the USGS 7½' topographic map series or have been described in the literature (Campbell 1978, Elliott 1963, Schultz 1969). Few have been well-studied and many sites have only been visited on rare occasions by anyone in the past 20 years.

Monitoring sites were selected to help define bat occurrence over a greater percentage of the Pryor Mountains area. This not only would indicate the suitability of individual sites, it would help define the range of individual species within the Pryor Mountains. Individual caves, large sinkholes, ponds and foraging areas were monitored or inspected to gain as much information as possible with the limited number of instruments available.

ANABAT recordings indicated that *Plecotus townsendii* use very few of these caverns. Table B1 provides a summary of the results from ANABAT monitoring in 1995. Many other sites were evaluated for bat potential based on direct inspection. Results of those evaluations are presented in Table B2.

**TABLE B1**  
**ANABAT RECORDING SUMMARY**  
**MISCELLANEOUS PRYOR MOUNTAINS CAVES AND MINES**

Site Name	Bat Abundance	Notes
Big Ice Cave	Moderate	Several <i>Antrozous pallidus</i> , and several undifferentiated <i>Myotis spp.</i>
Crater Ice Cave	None	No calls recorded; inside temperatures too cold and access usually restricted to one or two months per year by ice and snow.
Four-Eared Bat Cave	Moderate	Numerous <i>Antrozous pallidus</i> , and 1 <i>Lasionycteris noctivagans</i>
Frogg's Fault Cave	High	Multiple <i>Antrozous pallidus</i> , multiple <i>Myotis spp.</i> including <i>M. evotis</i> , several <i>Eptesicus fuscus</i> , and 11 <i>Plecotus townsendii</i> .
Gyp Springs	High	Several <i>Antrozous pallidus</i> , 3 <i>Eptesicus fuscus</i> , 6 <i>Lasionycteris noctivagans</i> , 3 <i>Lasiurus cinereus</i> , 10+ undifferentiated <i>Myotis spp.</i> , and 1 or more <i>Plecotus townsendii</i> .
Gypsum Creek	Moderate	1 <i>Lasionycteris noctivagans</i> or <i>Eptesicus fuscus</i> , and 5 undifferentiated <i>Myotis spp.</i>
Hilltop Catchment (BLM)	Low	3 <i>Myotis evotis</i> recorded
Pryor Gap Railroad Tunnel (abandoned)	None	NO CALLS RECORDED.
Red Pond near prospects N of Old Glory Mine	Low	1 <i>Lasionycteris noctivagans</i> , and < 5 undifferentiated <i>Myotis spp.</i>
Pond and Spring with small building near top of Red Pryor Mountain	Low	4 <i>Antrozous pallidus</i> calls discriminated from the wind noise on the recordings.

Site Name	Bat Abundance	Notes
Red Pryor Mountain Peak Pond	High	Multiple <i>Myotis spp.</i> , including <i>M. evotis</i> , and numerous <i>Antrozous pallidus</i> .
Sage Creek Campground	None	NO CALLS RECORDED.
Sage Creek Cave	None	NO CALLS RECORDED.
Sage Creek Road south of a few small caves	None	NO CALLS RECORDED.

**TABLE B2**  
**RECONNAISSANCE EVALUATION OF**  
**OTHER PRYOR MOUNTAINS MINES AND CAVES**

Site Name	Bat Use Potential	Observations
Blackie Ice Cave	Low	Crawlway passage too tight and twisted for bats; extremely cold temperatures inside; the sink is plugged by ice and snow much of the year.
Big Ice Cave	Moderate	Cold temperature and ice inside; bats have been observed inside during the summer; the roosts here are abandoned in late summer.
Crater Ice Cave	Low	Access is limited by an ice and snow plug to two to three months per year; cold temperatures and permanent ice inside the cave are a deterrent for bats; the large room and high ceiling would make an attractive site at a lower elevation.
Demijohn Flats Catchment (BLM)	Low	Completely dry at the time of my visit; its usefulness is limited to only the early part of the summer season most years.
Double Guzzler (BLM)	Moderate	Dry at the time of my visit; large surface area and unrestricted aerial approach make this an attractive watering hole for bats in this area; the nearest natural water is several miles away during the summer season.
Four-Eared Bat Cave	High	Known to contain <i>Plecotus townsendii</i> most years; good roost sites available with favorable temperature and humidity.
Frogg's Fault Cave	High	Known <i>Plecotus townsendii</i> hibernaculum and summer roost site; large rooms with many good roosting areas; technical climbing gear required for safe entry and exit.
Gypsum Creek ½ mile below Gyp Springs	Moderate	Open stretch of water with good foraging zone along both banks of the stream; this is the only permanent water available for many miles.
Gyp Springs	Moderate	A permanent spring; open stretch of water available for aerial approach from several directions.

Hilltop Catchment (BLM)	Moderate	Nearly dry at the time of my visit; large surface area available for skimming.
Pond, spring and buildings near top of Red Pryor Mountain	Low	Small surface area; usually very windy and often cold, even in summer; water available most of the year; unrestricted aerial approaches.
Pryor Gap Railroad Tunnel	Low	An unlined tunnel, 15 feet high, 8 to 10 feet wide; excavated through siltstones in horizontal layers; the rock is crumbly and has caved from the ceiling most of the way through the tunnel; bird nests near both ends inside; rock rubble lies 2 to 6 feet deep on the floor.
Red pond north of Old Glory Mine	Moderate	The only permanent water for many miles on top of Red Pryor Mountain; good surface area and easy approaches.
Red pond near peak of Red Pryor Mountain	High	Water available until late summer; large surface area and easy approaches.
Red Pryor Ice Cave	Low	Access restricted to only a few months per year by snow and ice plugs; two small portals; temperature inside is cold and there is permanent ice inside.
Sage Creek Campground	Low	Stream surface exposed but rough; aerial approaches limited to two directions.
Sage Creek Cave	None	Large complex shelter cave with short crawlways; ceilings are relatively smooth making them difficult roosting sites.
Small pond on Dry Head Vista Road above Big Ice Cave	Low	Small pond at high elevation; contains water into late summer; easy aerial approaches.
Unnamed blocked natural cave entrance downslope from the spring and building near the top of Red Pryor Mountain	None	Portal openings too small for most bats; available space inside very limited.
Unnamed cave sink	Low	Too small to provide much protection.
Unnamed crawly holes above 4WD road	Low	Too smooth to provide much roosting area; easy climbing access allows predators to harass occupants.
Unnamed dead-end sinkhole near Crater Ice Cave, no.1	None	No passage, no shelter.
Unnamed dead-end sinkhole near Crater Ice Cave, no.2	None	No passage, no shelter.
Unnamed group of three dead-end sinkholes	None	No passage, no shelter.
Unnamed huge dead-end sinkhole	None	No passage, only a few cracks available for shelter.
Unnamed large natural shelter cave	Low	Shallow shelter; large area suitable for roosting but protection is very limited.
Unnamed natural cave near CM&M East	Low	Passage very small but is accessible; evidence of small mammal use inside; passage extends a total of about 30 feet.

Unnamed natural tube cave up the mountain from Red Pryor Ice Cave	Low	Passage is small and limited to a short run; approach and entry is difficult.
Unnamed rock-lined sinkhole (possibly D-9 Cave)	Low	Crawlway entrance blocked by breakdown blocks; cracks available on highwall; snow and ice block the sink most of the year; wild flowers cover the inside walls of the sinkhole in late summer.
Unnamed sharp-walled sinkhole	None	No shelter; protection very limited; poor roosting sites.
Unnamed shelter cave at Lisbon Point ("Needle-Eye Cave")	Low	Small size is limiting; available shelter very small; often windy.
Unnamed shelter cave north of Sage Creek Road	Low	Small shelter; protection limited, smooth surfaces.
Unnamed sinkhole with small room next to the road on top of Red Pryor Mountain	Low	Too small to provide much shelter for bats; too cold and exposed to be used much of the year.
Unnamed small caves	Low	Insufficient passage; too open; too smooth for good roosting.
Unnamed small caves north of Sage Creek Road	Low	Insufficient passage; too open; too smooth for good roosting.

## RECOMMENDATIONS

Monitoring confirmed the presence of *Plecotus townsendii* at only two sites, Froggs Fault Cave and at Gyp Springs. Froggs Fault Cave was identified as an important bat site by Madson in 1992 (Madson et al. 1993). It and Four-Eared Bat Cave have been well-known for supporting modest populations of Western Big-Eared Bats nearly every year (Campbell 1978, Campbell 1992). These two sites need specialized management plans and regular monitoring. Numbers of bats in Four-Eared Bat Cave appear to be declining, perhaps due to over visitation by spelunkers (Campbell 1992).

Most of the sites visited during this study need checking at other times of the year. The cold, windy weather during the summer made the higher elevation sites unsuitable. Some of the higher caves (Little Ice, Mystery and Salt Lick) were inaccessible due to wet and muddy roads or snow at the time of field work and could not be visited. Other caves (Big Ice, Four-Eared Bat) are known to support bats (Madson 1992) but had few or none at the times visited in 1995.

## REFERENCES - SECTION B

- Campbell, N. P. 1978. Caves of Montana. Montana College of Mineral Science and Technology, Butte, Montana, 169 pp.
- Campbell, N. P. 1992. personal communication.
- Elliott, J. K. 1963. Cave occurrences in the Mississippian Madison Limestone of the Pryor Mountains, Montana. Billings Geological Society Miscellaneous Paper No.2, 16 pp.
- Madson, M., G. Hanson, S. Martinez, and D. Genter. 1993. Wintering bats in Montana: results of surveys in the Pryor Mountains with annotation on area caves and mines. Montana Natural Heritage Program. Helena, Montana.
- Schultz, R. L., Editor. 1969. Caves of the Big Horn and Pryor Mountains of Montana and Wyoming, National Speleological Society Guidebook No.10, National Speleological Society.

## SECTION C: RED LODGE COAL FIELD MINES

Coal mining began in this area in 1887 with the development of the coal mines around Red Lodge, Montana. These mines operated continuously until strip mines were opened at Colstrip in 1923. Around 1905 the first mines were developed in the Bearcreek area about 5 miles east of Red Lodge. The first large-scale mine was the Smith, followed by the Brophy Mine and others in 1906. Additional mines developed to serve either the railroads or local users.

Mine development followed the economic development of the region until the large strip mines opened in southern Montana. The cheaper coal from those mines forced the large underground mines to close. A period of renewed activity occurred during World War II, but at the end of the war most of the mines closed again. A few of the mines continued to operate sporadically or at a low level of production, mainly serving the local heating market. The last three mines to produce commercial coal were the Highway or Roadside Mine, the Foster Gulch Mines and the Brophy No.2 Mine.

The Highway Mine began development around 1904. It was never a major producer and served exclusively as a local source for heating fuel. Primarily operating in the winter months, it operated steadily until 1970 when forced to close because of safety concerns. It is one of the few mines in this area whose adits are still open.

The Foster Gulch Mines were a major extension of the Smith Mine for many years following the mine disaster at the Smith No.3 Mine in 1943. However, as demand for coal declined and misfortunes plagued the operations, the mining activity decreased until the mines ceased operating in the early 1950's. At that time the workings were connected with parts of the old Smith No.2 and No.3 workings, creating an extensive network of tunnels totalling tens of miles of passage. The mines were leased in 1953 for local production for a few years, but following that the mines remained inactive.

Prior to reclamation in the 1980's the Foster Gulch Mine site again produced coal commercially. Coal was separated and cleaned from the gob and waste rock piles on the mine site in concert with reclamation efforts by the Montana Department of State Lands. Process wash water was withdrawn from the flooded mine workings through a well but no portals were reopened. Portals from earlier mining were sealed and no underground workings were accessible. A few mine buildings from earlier production survived reclamation but were later removed by the land owner.

The Brophy No.2 Mine began in 1906 as the Smokeless and Sootless Coal Company near the upper end of Virtue Gulch. operations continued steadily until 1932 when the depression forced the mine to close. In 1940 the mine reopened and produced about 125 tons of coal per day until 1967 when the mine again closed. At the time of closure many miles of tunnels existed in two or three sets of galleries. Some areas of the mine were no longer accessible due to sealing or caving of the mined out sections.

The Brophy Mine site reactivated in 1978 under the efforts of the Beartooth Coal Company. Instead of supplying local domestic demand or the railroads, produced coal was primarily destined for an electric power plant in Portland, Oregon. By that time all earlier portals were sealed and the new mine developed undisturbed areas of coal in the bottom of the gulch between the two primary workings from earlier mining. Operational difficulties and economic changes forced the mine to close in 1980, but the site was kept in a state of readiness to resume production until late 1988. The mine failed to develop much past the initial stages and had only extended a few hundred feet into the deposits by the end of summer of 1979 (Kotson, 1995). This was the last underground mine in this area to cease operations.



ANABAT recordings in or near mine sites indicated mainly *Myotis* spp. with a few *Lasionycteris noctivagans* and a single *Eptesicus fuscus*. No *Plecotus townsendii* were detected and no local accounts of big-eared bats were obtained during interviews. Table C1 presents the results of the ANABAT survey and Table C2 contains the evaluations for bat potential for all area sites inspected in 1995.

**TABLE C1**  
**ANABAT RECORDING SUMMARY**  
**RED LODGE COAL FIELD MINES**

Site Name	Bat Abundance	Notes
Brophy No.2 Coal Mine	Low	A few undifferentiated <i>Myotis</i> sp. recorded. Coal mine inspector has reported large numbers of bats in the past.
Foster Gulch, near mouth	Low	All openings reported to be sealed. 1 <i>Eptesicus fuscus</i> , and 3 undifferentiated <i>Myotis</i> spp. detected at the mouth of the gulch.
Highway Mine, near the front gate	Moderate	4 <i>Lasionycteris noctivagans</i> , and 2 undifferentiated <i>Myotis</i> spp. detected at the mouth of the gulch.
Smith No.2 Mine, near corral	Moderate	8 undifferentiated <i>Myotis</i> spp. detected before batteries ran out.
Smith Prospect Adit	Low	1 undifferentiated <i>Myotis</i> spp. detected.

Although large numbers of bats were observed here in the recent past (Umsheid 1995), it is likely they were *Myotis* spp., and that most have since moved on to other areas as the adits have been sealed.

**TABLE C2**  
**RECONNAISSANCE EVALUATION OF**  
**RED LODGE COAL FIELD MINE ADITS**

Site Name	Bat Use Potential	Observations
Brophy Mine No.2 - Beartooth Coal Adits	Moderate	Two adits remain open and the ventilation adit is accessible through the fan and fan house. Available access through the two adits is limited by a major blockage from caving just inside the 15' diameter culvert portal of the main conveyor adit. The access status of the air adit is unknown since access is limited by the small size of openings in the fan housing and the door to the fan house is welded shut. Openings are favorable only for small <i>Myotis spp.</i> bats.
- historic adits	None	All early adits have been backfilled shut. No access to early workings is known to exist.
- structures	Low	All remaining structures in a poor or heavily vandalized condition. Some limited shelter is available in the sandstone storage garage and the sandstone office building, suitable for warm weather use by bats. No bats were observed in any structures at the time of inspections in 1995.
Burns Mine	None	Remaining structures unusable. Adit sealed by backfilling. No shelter or habitat remaining.
Foster Gulch Mines	None?	Site not seen but reported to be completely reclaimed. All portals sealed and no remaining structures.
Highway Mine	None	Adits and upper gulch area not inspected, but buildings and equipment remain near the highway. A few bats were observed flying around the mouth of the gulch. The mine workings are reported to be over a mile in length, accessible through two portals and a ventilation culvert pipe.
Smith No.2	Moderate	Most main portals reported to be sealed but air shafts and ancillary openings may still connect with the underground workings. Tunnels connect Smith No.2 with Smith No.3 and the Foster Gulch Mines. However, water has flooded an undetermined but large portion of the historic workings. Direct inspection underground is impossible at this time.

Smith Prospect adit	Low	Portal was backfilled shut some time ago but animal burrowing has opened a small access crawlway which may reach the underground tunnels. The adit is at the mouth of a small gulch filled with tall shrubs and small trees.
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## RECOMMENDATIONS

Sensitive or threatened species were not identified in the Bearcreek area. Only a few of the mines retain features representing suitable habitat for bat use. As a result, preservation of those features cannot be considered a high priority, especially since natural features serving that function can be found on the mountain slopes outside of Red Lodge. However, if local planning goals allow the option for preservation of habitat, that choice should be given greater consideration to provide a diversity of habitat choice and to counteract loss of habitat from disturbance at other sites

Those mine sites containing features suitable for roosting or other bat applications would include:

- Brophy No.2 Mine (buildings, adits and tunnels)
- Highway (Roadside) Mine (buildings, adits, tunnels and equipment)
- Smith Mines, No.2 and No.3 (Air shafts, structures, tunnels and vegetation)

Additional work to differentiate *Myotis* spp. utilizing the mine areas is needed to further evaluate the value of these sites as a resource for bat use.

## REFERENCES - SECTION C

- Anderson, P. 1993. Definition and evaluation of the Bear Creek Mining District, Carbon County, Montana, GCM Services, Inc., November 1993.
- Beartooth Coal Company. 1979. Mining plan, Beartooth Coal Company, Carbon County, Montana, large format map, scale 1"=200 feet, May 1979.
- Beartooth Coal Company. 1980. Permit map and mining plan, Beartooth Coal Company, Red Lodge, Montana, large format map, scale 1"=100 foot, May 1980.
- Darrow, G. 1955. The Bearcreek Coal Field, Billings Geological Society Guidebook, 5th Annual Field Conference, September 9-11, 1954, pp.130-132.
- Hydrometrics, Inc. 1987. Red Lodge Coal Company, proposed mine plan, Hydrometrics, Inc., large format map, scale 1"=200 feet, 2/19/87.
- Kotson, J. 1995. former employee of Beartooth Coal Company, interview with Sam Martinez, Helena, Montana.
- Morgan, T. 1966. History of coal mining in Montana. *in* Proceedings of the First Montana Coal Resources Symposium, compiled by S. L. Groff, pp.3-5.
- Umsheid, R. 1995. mine inspector, MT Dept. of Labor, Personal Communication.

## SECTION D: KOOTENAI NATIONAL FOREST SITES

Observations in northwest Montana were primarily confined to property within the boundaries of the Kootenai National Forest. Survey locations visited in 1995 were chosen to represent a mix of abandoned mine sites, foraging areas and transition zones where bats would be expected to travel. Areas of study covered by other investigators were avoided to extend inventory activities into areas not previously assessed. As a result, the area covered by this study was limited primarily to the southern half of the Kootenai National Forest.

Survey sites were chosen with some care since prime locations are spaced widely apart and equipment capabilities are limited. Roads and site conditions require extra travel time and greatly limit the geographic coverage possible with a single investigator. Mine sites were chosen by first selecting those adits containing enough passage length to provide a protected and stable environment. Sites were further evaluated based on information recorded in the Abandoned Hardrock Mine Inventory assembled by a number of private contractors and maintained by the Abandoned Mine Reclamation Bureau (Department of State Lands) in Helena, Montana. To complete the list of survey sites, maps or field reconnaissance near the primary sites helped reveal favorable study areas within working reasonable distance. Knowledgeable local individuals contacted for information also helped choose sites for study.

The District Office of the Kootenai National Forest in Libby provided valuable information to assist in locating specific sites and for screening out unnecessary ones. Their information on the only known natural caves on the Forest convinced me to eliminate them from this study because of their high elevation and the unusually cold, wet weather. The windy weather on more than one occasion prevented the ANABAT detectors from clearly recording any data for some of the sites.

ANABAT recordings identified at least five different species of bats in the Kootenai National Forest. These included:

- Eptesicus fuscus*
- Lasionycteris noctivagans*
- Lasiurus cinereus*
- Myotis evotis*
- Plecotus townsendii*
- and undifferentiated *Myotis* spp.

Table D1 presents a summary of the ANABAT results from 1995 surveys. Table D2 presents the results of direct observation evaluation of these and other sites visited in 1995.

**TABLE D1**  
**ANABAT RECORDING SUMMARY FOR**  
**KOOTENAI NATIONAL FOREST SITES**

Site Name	Bat Abundance	Notes
ASARCO - Park Creek tailings impoundment	None	Dry at time of visit NO CALLS RECORDED.
Big 8 Mine - north (upper) adit area	Moderate	1 <i>Eptesicus fuscus</i> , 1 <i>Lasionycteris noctivagans</i> , 4 undifferentiated <i>Myotis spp.</i> , and 1 <i>Plecotus townsendii</i> .
- south adit	Low	1 undifferentiated <i>Myotis spp.</i> only.
Bull Lake - north end	Moderate	2 <i>Eptesicus fuscus</i> , and 7 undifferentiated <i>Myotis spp.</i>
- south end	Moderate	6 <i>Eptesicus fuscus</i> , 12 <i>Lasionycteris noctivagans</i> , and 2 undifferentiated <i>Myotis spp.</i>
Bull River Guard Station (historic structure)	None	1 <i>Lasionycteris noctivagans</i> only.
Bull River Campground	None	NO CALLS RECORDED.
Cherry Creek Mill site	High	1 <i>Antrozous pallidus</i> (or <i>Myotis sp.</i> ), 10 <i>Eptesicus fuscus</i> , 1 <i>Lasionycteris noctivagans</i> (or <i>Eptesicus fuscus</i> ), 1 <i>Lasiurus cinereus</i> , 20 undifferentiated <i>Myotis spp.</i> and 5 <i>Plecotus townsendii</i> .
Crescent Mine area	Low	2 undifferentiated <i>Myotis spp.</i> only.
Double Mac Mine area	Moderate	1 <i>Lasionycteris noctivagans</i> , 11 undifferentiated <i>Myotis spp.</i> and 2 <i>Plecotus townsendii</i> .
Forest Service Road 231	High	10 <i>Eptesicus fuscus</i> , 4 <i>Lasionycteris noctivagans</i> , 2 <i>Lasiurus cinereus</i> , 2 <i>Myotis evotis</i> , 11 undifferentiated <i>Myotis spp.</i> , and 4 <i>Plecotus townsendii</i> .
Herbert Mine	Low	1 undifferentiated <i>Myotis spp.</i> , and 1 <i>Plecotus townsendii</i> .
Libby Creek road FS231 at junction with Poker Hill Road	Low	3 <i>Lasionycteris noctivagans</i> only.
Liberty Mine Adit and Mill site	None	NO CALLS RECORDED.
Luken-Hazel Mine II	Moderate	5 <i>Eptesicus fuscus</i> , 4 <i>Lasionycteris noctivagans</i> , 3 <i>Lasiurus cinereus</i> , 1 undifferentiated <i>Myotis spp.</i> , and 1 <i>Plecotus townsendii</i> .
Midas Creek near conjunction with Libby Creek	None	NO CALLS RECORDED.

Site Name	Bat Abundance	Notes
Midas Mine site	Low	1 <i>Lasionycteris noctivagans</i> , and 2 undifferentiated <i>Myotis spp.</i>
Mitchell Creek Mine adit	High	several <i>Antrozous pallidus</i> , multiple <i>Eptesicus fuscus</i> , multiple <i>Lasionycteris noctivagans</i> , and multiple undifferentiated <i>Myotis spp.</i>
Mountain View Park, Libby, near Kootenai River	Moderate	2 <i>Eptesicus fuscus</i> , 2 <i>Lasiurus cinereus</i> , 1 <i>Myotis evotis</i> , and 24 undifferentiated <i>Myotis spp.</i>
Rest area 1 mile east of Troy, MT	Low	2 <i>Lasionycteris noctivagans</i> , and 1 undifferentiated <i>Myotis spp.</i>
Snowshoe Mine - at highest open adit	Low	1 <i>Eptesicus fuscus</i> only.
Snowstorm Mine - at camp buildings	Unknown	NO DATA. TAPE RECORDER MALFUNCTION.
Saint Anthony Mine	Unknown	NO DATA. DOG INTERFERENCE.
Saint Paul Mine	Low	NO CALLS RECORDED.
Stimson Lumber Company, Libby Mill treatment ponds, near Libby Creek	Moderate	1 <i>Lasiurus cinereus</i> , 3 <i>Myotis evotis</i> , and 20 undifferentiated <i>Myotis spp.</i>
Swamp Creek bench south of airstrip	Low to Moderate	6 <i>Lasionycteris noctivagans</i> before tape ran out.
Tombstone Claim shaft	None	NO CALLS RECORDED.
Unnamed lake on Flower Creek	Low	NO CALLS RECORDED.
Vermiculite Mountain/Rainy Creek - Lower Pond at access gate	Moderate	2 <i>Eptesicus fuscus</i> , 3 <i>Lasionycteris noctivagans</i> , and 6 undifferentiated <i>Myotis spp.</i>
- Upper Pond near dam	None	NO CALLS RECORDED.
West Fisher Creek at FS231	None	NO CALLS RECORDED.
Zonolite Mine adit area	None	NO CALLS RECORDED.

**TABLE D2**  
**RECONNAISSANCE EVALUATION OF**  
**KOOTENAI NATIONAL FOREST SITES**

Site Name	Bat Use Potential	Observations
ASARCO - Park Creek tailings impoundment	Low	Dry most of the time; the creek is some distance away.
Big 8 Mine	Moderate	Small openings lead to significant passage; multiple adits, but the mill is destroyed and scattered.
Bull Lake, north end	Moderate	Good foraging area, large expanse of smooth water.
Bull Lake, south end	Moderate	Good foraging area, large expanse of smooth water.
Bull River Campground	Moderate	Good foraging area, large expanse of smooth water.
Cherry Creek Mill site	High	Good foraging area; water available and accessible nearby; some shelter available under old foundations.
Crescent Mine	Low	Good foraging area but water not available nearby.
FS Road 231 site	High	Open flyway between foraging and roosting areas; location on steep slope sees many different species of bats that normally cruise at different heights.
Herbert Mine	Low	Adit nearly sealed by collapse; surrounding area heavily wooded; water not available nearby.
Libby Road at Poker Hill	Moderate	Open area through forest at logging road; good foraging area; running creek nearby.
Liberty Mine	None	Mill nearly disintegrated; adit collapsed for first 60 feet of passage; no entry possible.
Luken-Hazel Mine II	Moderate	Adit sealed but surrounding area has good foraging and natural shelter.
Midas Creek	Low	Trees and water available, but flying insects not plentiful.
Midas Mine	None	Thickly forested area; adit collapsed but surrounding area attractive for foraging.
Mitchell Creek Mine	High	Wide-open adit in competent rock outcrop; Kootenai River a short distance away; opens onto a rocky hillside overlooking pasturage.
Montezuma Mine	Unknown	Good foraging area; water available; reported to have locked adit door; condition of adit not known.
Mountain View Park, across the Kootenai River from (near Stimson Lumber Company, Libby)	Moderate	Foraging area near the Kootenai River.
Saint Anthony Mine	None	Steel door over the adit; some small cracks around the edge but animal entry is almost impossible.



Site Name	Bat Use Potential	Observations
Saint Paul Mine	Moderate	Two adits with ample passage; mining equipment scattered at the site; possible explosives inside.
Snowshoe Mine	Moderate	Four open adits; some connect with thousands of feet of underground passageways; may be too cold for bats; mine was not entered.
Snowstorm Mine	Moderate	Three known adits; mine was not entered; significant passage available; <i>Plecotus</i> and other bats seen along the creek.
Stimson Lumber Company, Libby	Moderate	Treatment ponds and Libby Creek provide water and forage areas; flying insects abundant.
Swamp Creek	Moderate	Narrow, deep valley with tall grass pasturage; good foraging area.
Tombstone Mine - Main Adit	High	Over 1,300 feet of passage available; status of adit unknown.
- Shaft	Low	Shaft 35 feet deep; limited shelter; small drift at bottom.
Troy Highway Rest Stop/Weigh Station	High	Good foraging areas all around; Kootenai River < ¼ mile away.
Unnamed lake on Flower Creek	Moderate	Dense forest and deep, heavily wooded gulch; abandoned mines with adit doors near upper end of lake.
Vermiculite Mountain/Rainy Creek - Lower Pond	Moderate	Mine is shut down; water is still available at the lower pond; no noise or disturbances; surrounding forest has been thinned; weather cold and windy at the time of inspection.
- Upper Pond	Low	Water level very low; large surface area available; surrounding forest greatly modified.
West Fisher Creek site	Moderate	Pasture; foraging area surrounded by heavy forest.
Zonolite Mine, adit area	Low to Moderate	Cold, windy area; good foraging available; running water available; adit may be sealed; Zonolite mine is multi-level and contains thousands of feet of passage.

## RECOMMENDATIONS

Although *Plecotus townsendii* were detected near mine adits at several sites, they were not detected or observed inside any of the sites selected for study. A number of abandoned mine adits possessed characteristics and conditions favorable for their use as summer roosts and hibernaculum (Hensley and Scott 1995, Clark et al. 1989). However, none of the ANABAT detectors recorded *P. townsendii* inside any of the open adits. Additional surveys of other mine adits earlier in the year would help determine what features are attractive to bats and which bats are using the adits.

A few of the survey sites are listed for reclamation priority (Pioneer Technical Services 1994, 1995). These include the Mitchell Creek Mine, the Snowshoe Mine, and the Cherry Creek Mill site. The Mitchell Creek and Cherry Creek sites demonstrated a high level of use by a variety of bat species from the ANABAT recording data. All three of these sites also scored favorably for bat potential based on characteristic

evaluation. Any reclamation plans involving these sites should consider their value for habitat when selecting options for remediation.

The ANABAT results indicate an abundance and variety of bat species at many of the sample sites selected for study. A few of the adit sites exhibit similar results, but many of the other adits were sealed or contained few bats. A study identifying bat roost locations and habitat would be useful in evaluating the value of those adits still existing. Also winter surveys of known open adits would help determine whether these artificial caves provide any winter hibernacula.

#### REFERENCES - SECTION D

Hensley, S., and C. Scott. 1995. Ozark big-eared bat (*Plecotus townsendii ingens* [Handley]) revised recovery plan, U.S. Fish and Wildlife Service, February 1995, Tulsa, OK.

Montana Department of State Lands. 1995. Abandoned hardrock mine inventory. vertical and computer files.

Pioneer Technical Services, Inc. 1994. Abandoned hardrock mine priority sites 1994 summary report. Montana Department of State Lands, Abandoned Mines and Reclamation Bureau, March 1994, 315 pp.

Pioneer Technical Services, Inc. 1995. Abandoned hardrock mine priority sites 1995 summary report. Montana Department of State Lands, Abandoned Mines and Reclamation Bureau, April 1995, 325 pp.

## SECTION E: RAVALLI MINE SITE

The principal item of interest consists of a small horizontal adit which opens onto an old terrace of the Jocko River at the foot of a steep slope. The mine is unnamed and has not been fully recorded by the Montana Abandoned Mine Reclamation Program. The location is within view of the highway, less than ½ mile away. At the time of my visit on September 8, 1995, its appearance did not attract undue attention.

Access to the site is nearly unrestricted, only a barbed-wire fenced pasture lies between the road and the portal. Slumping soil and rock fragments have partially blocked the entrance and disintegration of the rock near the surface around the entrance has weakened the integrity of the entrance structure. The adit is timbered for only a short distance inside and erosion of the entrance has exposed the timbering back to the second set of vertical supports.

Western Big-Eared bats (*Plecotus townsendii*) are known to use this mine adit during the summer. Live specimens were not observed on this visit but three dead individuals were collected in the twilight zone within the timbered portion of the passage. Two were on the dirt floor and had been hollowed out by ants or insects. The third specimen was hanging on a vertical timber and was completely dehydrated. All three were transported in a cooler to the Natural Heritage Program office in Helena for identification and study.

Evidence of other animal use was observed, mainly near the entrance. Bird feathers, moth wings, mammal scat and litter from a packrat nest were scattered across the floor for the first 30 feet of passage. A few representative samples were collected for later study. The packrat was observed on the wall of the passage approximately 40 feet from the entrance. It retreated to the nest atop the timber roof near the entrance as I passed by.

I did not fully explore the adit and no surveying was attempted. A single pass from the entrance back to a rubble floored room was made to check for bats and any unusual features. The passage appeared stable, although moist, from the timbered section all the way to the breakdown area. No further signs of bats were observed.

## **APPENDICES**

- I. Site Location Maps
- II. Entrance/Anabat Site Location Data
- III. Cavern Inventory Forms
- IV. Processed ANABAT Data Plot Summaries

## **APPENDIX I: SITE LOCATION MAPS**

## APPENDIX II: ENTRANCE/ANABAT SITE LOCATION DATA

### **APPENDIX III: CAVERN INVENTORY FORMS**

## **APPENDIX IV: PROCESSED ANABAT DATA PLOT SUMMARIES**



**APPENDIX IV-A**  
**PROCESSED ANABAT DATA SUMMARY FOR**  
**PRYOR MOUNTAINS MINES RECLAMATION SITES**

ANABAT Site	Archive Directory	Plot Analysis Summary
CM&M Pit East site - adit and dump area	C&MEAST	CM&M Pit East Adit, 40' inside Sam Martinez, 8/30/95 Barren land RESULTS: Myotis spp. calls (2) @ 8:34 & 8:40 pm  LOTS OF INTERFERENCE ACTIVATING TAPE RECORDER.
CM&M West Adit - short adit and collapsed adit	C&MWEST	C&M Adit West--Pryor Mountains Sam Martinez, 7/21/95 Ungrazed or lightly grazed sagebrush, steppe rangeland RESULTS: NO CALLS RECORDED.
Dandy Mine - upper west group, Adit No.4	DANDYWST	Dandy West Adit, 30 feet inside Ungrazed rangeland Sam Martinez, 8/30/95 RESULTS: numerous Antrozous pallidus (not all saved onto computer).  TAPE RAN OUT BEFORE END OF NIGHT.
Dandy Mine - upper west group, Adit No.5	DANDYWC	Dandy Mine westcentral adit Sam Martinez, 8/30/95 RESULTS: 8:15 on: 14 Plecotus townsendii 8:34 on: 7 Myotis spp. 8:53 on: numerous Antrozous pallidus (not all recorded) 9:46: Eptesicus fuscus (1)
Dandy Mine - west group, lower area, Adit No.6	SDANDY	Dandy Adit South, lower level Sam Martinez, 8/30/95 RESULTS: 8:11 pm on: 5 Myotis spp. 9:15 pm: 2 Plecotus townsendii 9:35 pm on: multiple Antrozous pallidus
Lisbon Point Mine - east adit	-----	NO CALLS RECORDED.
Lisbon Point Mine - west adit	LISBON	Lisbon Point West Adit, Pryor Mountains Sam Martinez, 7/4/95 Sagebrush, shrubsteppe RESULTS: all Antrozous pallidus TIMER NOT WORKING.
Marie Mine - adit	MARIE	Marie Mine Adit Sam Martinez, 8/30/95 RESULTS: numerous Antrozous pallidus 2 Myotis spp. BATTERIES RAN LOW, MAKING CALLS DIFFICULT TO DISCERN (SPED UP) PAST 10 PM.
Old Glory Mine (Ponderosa) - lower east adit	OLDGLORY	Old Glory Mine, south adit Sam Martinez, 8/29/95  RESULTS: all calls recorded were Antrozous pallidus, beg. @ 8:30 pm BATTERIES DEAD BY 10:15 PM.
Robert's Incline	ROBERTS	Roberts Incline Mine Adit Sam Martinez, 9/24/95 NO CALLS RECORDED.
Sandra Mine - inside adit	SANRMIN	Sandra Mine Sam Martinez, 8/29/95 RESULTS: 3 possible Antrozous pallidus (or Myotis spp.) ca. 8:30 pm (interference prevented distinction by sound)
Swamp Frog Mine - central 1 site, outside of adit	SWAMPFR2	Swamp Frog Mine-New Year Adit Sam Martinez, 8/31/95 RESULTS: 6 Myotis spp., beg. at 9 am 1 probable Plecotus townsendii @ 10:23 am Antrozous pallidus (1) ca. 4 am
Swamp Frog Mine - central 1 site, outside of adit	SWAMPFR3	Swamp Frog Mine, New York -.1 adit Sam Martinez, 9/24/95 NO CALLS RECORDED.

Swamp Frog Mine - at reclaimed west adit site above dry braided stream bed	SWAMPFRG	Swamp Frog Mine: New Year #1 adit Sam Martinez, 8/30/95 Ungrazed or lightly grazed rangeland, sagebrush, steppe Dry crooked creek RESULTS: numerous Myotis spp. BATTERIES DEAD BY 11 PM; CALLS NO LONGER DISCERNABLE
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**APPENDIX IV-B**  
**PROCESSED ANABAT DATA SUMMARY FOR**  
**OTHER PRYOR MOUNTAINS SITES**

ANABAT Site	Archive Directory	Plot Analysis Summary
Four-Eared Bat Cave	4EARCAVE	Four-Eared Bat Cave Sam Martinez, 8/31/95 RESULTS: numerous <i>Antrozous pallidus</i> beg. @ 8:57 pm & resurging @ 3 am single <i>Lasionycteris noctivagans</i> @ 1:58 am
Big Ice Cave - at the foot of the stairs inside the portal	BIGICE2	Big Ice Cave inside portal Sam Martinez, 9/22/95 NO CALLS RECORDED. BATTERIES DEAD (?)
Big Ice Cave - pointing across the portal, down Cave Creek Canyon	BIGICECV	Big Ice Cave, pointed downstream over creek Sam Martinez, 7/22/95 Mature mixed conifer RESULTS: several <i>Antrozous pallidus</i> & <i>Myotis</i> spp. calls began @ 11:35pm & ran till ca. 4 am LOTS OF GARBAGE PICKED UP ON TAPE.
Crater Ice Cave - large single-room cave	CRATER	Crater Ice Cave Sam Martinez, 9/29/95 NO CALLS RECORDED.
Frogg's Fault Cave	FROGGFLT	Frogg's Fault Cave Sam Martinez, 8/31/95 RESULTS: beg. @ 9pm: multiple <i>Antrozous pallidus</i> multiple <i>Myotis</i> spp. & <i>evotis</i> several <i>Eptesicus fuscus</i> 11 <i>Plecotus townsendii</i> : 9:58, 10:02, 11:08, 11:20, 11:39
Gyp Springs	GYSPRG	Gyp Springs Sam Martinez, 8/31/95 RESULTS: --8:58 pm on: 3 <i>Eptesicus fuscus</i> --9 pm on: 6 <i>Lasionycteris noctivagans</i> --9:32 pm: 1 <i>Plecotus townsendii</i> --9:50 pm on: 10 <i>Myotis</i> spp. --11:08 pm on: 3 <i>Lasiurus cinereus</i> --12:33 am: several <i>Antrozous pallidus</i>
Gyp Springs - detector pointing downstream through fence	GYSPRG2	Gyp Springs pointing downstream Sam Martinez, 9/24/95 RESULTS: 8:10 pm, single <i>Plecotus townsendii</i> 8:11 pm, 2 <i>Myotis</i> spp. BATTERIES DEAD BEFORE ALL CALLS RECORDED.
Gypsum Creek - 1/2 mile downstream from Gyp Springs	GYPSUMCR	Gypsum Creek 0.5 mile downstream of Gyp Springs Sam Martinez, 9/24/95 RESULTS: 5 <i>Myotis</i> spp. beg. @ 8:04 1 <i>Lasionycteris noctivagans</i> OR <i>Eptesicus fuscus</i> (couldn't distinguish because of interference)  LOW BATTERIES BY MORNING
Hilltop Catchment (BLM)	SWAMPNW	Mystery water catcher 1.35 mi. south of NW adit of Swamp Frog Mine Sam Martinez, 9/24/95 RESULTS: 3 <i>Myotis evotis</i> , 7:52 pm Batteries dead before all calls recorded.
Pryor Gap Railroad Tunnel (abandoned)	PRYORRR	Pryor RR tunnel Sam Martinez, 9/21/95 NO CALLS RECORDED.
Red Pond beside the summit road north of Old Glory Mine	REDPOND	Red Pond, north of Old Glory Mine Sam Martinez, 8/29/95 Shrubsteppe on dam of pond @ SE end RESULTS: <5 <i>Myotis</i> spp. calls recorded 1 <i>Lasionycteris noctivagans</i> --lots of external interference may have excluded a number of calls.
Spring and small pond near buildings SW of the peak of Red Pryor Mountain	REDPRY2	Road and Spring on top of Red Pryor Mountain; small building Sam Martinez, 8/29/95 RESULTS: entire tape was interference, aside from 4 <i>Antrozous pallidus</i> calls (the only discernable calls)

Pond SE of the peak of Red Pryor Mountain	REDPRYOR	Red Pryor Mountain Peak Pond Sam Martinez, 8/28/95 RESULTS: multiple Myotis spp., Antrozous pallidus, Myotis evotis NOT ALL CALLS RECORDED; LOTS OF INTERFERENCE
Sage Creek Campground	SAGECRCG	Sage Creek Campground Sam Martinez, 9/22/95 NO CALLS RECORDED; ENTIRE TAPE CONSISTED OF INTERFERENCE.
Sage Creek Cave	SAGECRCV	Sage Creek Cave Sam Martinez, 9/22/95 NO CALLS RECORDED.
Sage Creek Road - near Sage Creek, south of small caves in the steep hills	SAGECRRD	Sage Creek Road; small drainage 2.3 mi. east of Pryor Rd junction Sam Martinez, 9/22/95 NO CALLS RECORDED; BATTERIES DEAD.

**APPENDIX IV-C  
PROCESSED ANABAT DATA SUMMARY FOR  
RED LODGE COAL FIELD MINES**

<b>ANABAT Site</b>	<b>Archive Directory</b>	<b>Plot Analysis Summary</b>
Brophy No.2 Mine - detector pointing NW across the Beartooth Coal Co. conveyor adit	BROPHYMN	Brophy Mine No. 2 - conveyer adits Sam Martinez, 9/23/95 RESULTS: 4 Myotis spp. ca. 6:36 pm BATTERIES DEAD BEFORE ALL CALLS RECORDED.
Foster Gulch Mine area - detector placed near mouth of Foster Gulch	FOSTER	Mouth of Foster Gulch in Bear Creek Sam Martinez, 9/23/95 RESULTS: 3 Myotis spp. ca. 8:25 pm 1 Eptesicus fuscus, 10:02 pm
Highway (Roadside) Mine - detector placed at the entrance gate off the main highway	HWYMINE	Highway Mine Sam Martinez, 9/23/95 RESULTS: 4 Lasionycteris noctivagans, beg. @ 8:26 pm 2 Myotis spp., beg. @ 9:04 pm  Batteries dead before all calls recorded.
Smith Prospect Adit - near highway	SMITH	Smith Prospect Adit Sam Martinez, 9/23/95 RESULTS: 7:47 pm: 1 Myotis spp.
Smith Mine No.2 - corral portal area	SMITHMN3	Smith Mine Site #2 Sam Martinez, 9/23/95 RESULTS: 8 Myotis spp. recorded before batteries died.

**APPENDIX IV-D  
PROCESSED ANABAT DATA SUMMARY FOR  
KOOTENAI NATIONAL FOREST SITES**

ANABAT Site	Archive Directory	Plot Analysis Summary
ASARCO Park Creek Tailings Impoundment	ASARCO	ASARCO Tailings Impoundment Sam Martinez, 9/9/95 NO CALLS RECORDED.
Big 8 Mine - North Adit	BIG8MINE	Big 8 Mine Upper (north) adit Sam Martinez, 9/9/95 RESULTS: 8:35 pm--4 Myotis spp. 8:50 pm--Eptesicus fuscus 9:08 pm--Plecotus townsendii 10:10 pm--Lasionycteris noctivagans Machine malfunction prevented further analysis
Big 8 Mine - South Adit	BIG8S	South Adit of Big 8 Mine Sam Martinez, 9/8/95 RESULTS: 9:14 pm: single Myotis spp. recorded
Bull Lake - at north end	NBULLLK	North end of Bull Lake Sam Martinez, 9/9/95 RESULTS: 7 Myotis spp., beg. @ 1:51 am 2 Eptesicus fuscus, beg. @ 5:31 am
Bull Lake - at south end	SBULLLK	South end of Bull Lake Sam Martinez, 9/9/95 RESULTS: 6 Eptesicus fuscus, beg. @ 1:37 am 12 Lasionycteris noctivagans, beg. @ 1:44 am 2 Myotis spp., beg. @ 4:29 am
Bull River Guard Station - historic structures	BULLRIV	Bull River Guard Station (Historic) Sam Martinez, 9/9/95 RESULTS: single Lasionycteris noctivagans recorded
Bull River Campground	BULRIVCG	Bull River Campground, Kootenai National Forest Sam Martinez, 9/8/95 NO CALLS RECORDED, POSSIBLY DUE TO ASPEN NOISE (TAPE FULL BUT NO BAT CALLS).
Cherry Creek Mill site - partially reclaimed ore processing plant	CHERRYCR	Cherry Creek Mill Site Sam Martinez, 8/5/95 Mature conifer/deciduous mixed forest RESULTS: Eptesicus fuscus: 10 calls, beg. @ 9:35 pm Myotis spp.: 20 calls, ca. 10 pm & 1 am Lasionycteris noctivagans (? or Epfu): 1 call, 11:14 pm Antrozous pallidus (? or Mysp): 1 set of calls, 12:39 am Lasiurus cinereus: 1 call, 2:21 am Plecotus townsendii ???? : 5 calls in question, ca. 10:30 pm
Crescent Mine - on the access road a short distance from the mine	CRESCENT	Crescent Mine Sam Martinez, 9/9/95 RESULTS: 2 Myotis spp., beg. @ 11:42
Double Mac Mine outside the collapsed main adit	DOUBLE	Double Mac Mine near Libby Sam Martinez, 8/6/95 collapsed adit in cedar grove near creek RESULTS: 10:05 pm 1st 2 calls, Plecotus townsendii 10:14-11:42: 11 Myotis spp. (2 possible evotis), + 1 @ 5:51 am 1 Lasionycteris noctivagans @ 10:35 pm
Forest Service Road 231 - on the mountainside above the Montezuma and Standard Creek Mine sites	FSRD231	Forest Service Road 231 Sam Martinez, 9/10/95 RESULTS: 11 Myotis spp. beg. @ 10:39 pm 4 Lasionycteris noctivagans beg. @ 11:02 pm 4 Plecotus townsendii beg. @ 11:05 pm 10 Eptesicus fuscus beg. @ 11:34 pm 2 Lasiurus cinereus beg. @ 1:22 am 2 Myotis evotis beg. @ 4:21 am
Herbert Mine site	HERBERT	Herbert Mine Sam Martinez, 8/4/95 RESULTS: single Myotis spp. recorded @ 11:02 pm  8/5/95: day 2 RESULTS: single Plecotus townsendii recorded @ 11:37 pm

Libby Road - Forest Service Rd 231 at the junction with the Poker Hill Road	LIBBYRD	Libby Creek Road 231 @ junction with Poker Hill Road Sam Martinez, 9/10/95 RESULTS: 3 <i>Lasionycteris noctivagans</i> , beg. @ 8:34 pm
Liberty Mine - adit (collapsed) and mill ruin site	LIBERTY	Liberty Mine adit & mill Sam Martinez, 9/9/95 NO CALLS RECORDED.
Luken-Hazel II mine site	LUKENHAZ	Luken Hazel Mine II Sam Martinez, 8/4/95 RESULTS: 9:52 pm: <i>Myotis</i> spp., 1 call 10:02 pm on: <i>Lasiurus cinereus</i> , 3 calls 10:27 pm on: <i>Eptesicus fuscus</i> , 5 calls 11:04 pm on: <i>Lasionycteris noctivagans</i> , 4 calls 12:26 am: <i>Plecotus townsendii</i> , 1 call
Midas Creek - at road crossing near conjunction with Libby Creek	MIDASCR	Midas Creek near conjunction with Libby Creek Sam Martinez, 9/10/95 NO CALLS RECORDED.
Midas Mine site	MIDASMN	Midas Mine Site Sam Martinez, 9/10/95 RESULTS: 10:39 pm: 2 <i>Myotis</i> spp. 10:50 pm: 1 <i>Lasionycteris noctivagans</i>
Mitchell Creek Mine - adit	MITCHELL	Mitchell Creek Mine Adit Sam Martinez, 9/11/95 RESULTS: multiple <i>Lasionycteris noctivagans</i> , <i>Eptesicus fuscus</i> , <i>Myotis</i> spp.  several <i>Antrozous pallidus</i>
Mountain View Subdivision, Libby - near the Kootenai River	MTNVIEW	Mountain View, Kootenai River Sam Martinez, 8/3/95 Streamside riparian, decent shape RESULTS: 24 <i>Myotis</i> spp. calls 12:13 pm, 12:45, 1:02 am, 4, 4:30 2 <i>Eptesicus fuscus</i> , 12:08, 3:12 am 2 <i>Lasiurus cinereus</i> , 2:51 am, 4:31 1 <i>Myotis evotis</i> , 3:03 am  LOTS OF INTERFERENCE ON TAPE.
Rest Area 1 mile east of Troy, MT	REST	Rest area 1 mile east of Troy Sam Martinez, 9/9/95 RESULTS: 12:31 am: 1 <i>Myotis</i> spp. 12:57 am: 2 <i>Lasionycteris noctivagans</i>
Saint Anthony Mine - outside adit	STANTHNY	St. Anthony Mine Adit Sam Martinez, 9/11/95 NO CALLS RECORDED. BATTERIES DEAD.
Saint Paul Mine	-----	NO CALLS RECORDED.
Snowshoe Mine - highest open adit	SNOWSHOE	Snowshoe Mine adit, east side draw Sam Martinez, 8/5/95 RESULTS: 1 call recorded, 11:53 pm, <i>Eptesicus fuscus</i>
Snowstorm Mine - at the mine camp area below the adits	SNOWSTRM	Camp below Snowstorm Mine Sam Martinez, 9/9/95  NO DATA--TAPE MALFUNCTION
Stimson Lumber Company - treatment ponds near Libby Creek	STIMSON	Stimson Lumber Co., Libby Creek Sam Martinez, 8/3/95 RESULTS: 11:12 pm-ca. 5 am: 20 <i>Myotis</i> spp. 11:12 pm: 1 <i>Lasiurus cinereus</i> 2:33 am: 3 <i>Myotis evotis</i>
Swamp Creek - on the bench above the creek, south of the airstrip	SWAMPCR	Swamp Creek Bench south of airstrip Sam Martinez, 9/10/95 RESULTS: 6 <i>Lasionycteris noctivagans</i> , beg. @ 8:38 pm TAPE RAN OUT BEFORE ALL CALLS RECORDED.
Tombstone Claim - detector near shaft pointing up toward main adit	TOMBSTON	Tombstone Mine Adit Sam Martinez, 9/11/95 NO CALLS RECORDED.
Unnamed large pond on Flower Creek	-----	NO CALLS RECORDED.

Vermiculite Mountain/Rainy Creek - lower pond, near gate	LOWPOND	Vermiculite Mountain--lower tailings pond at access gate Sam Martinez, 9/11/95 RESULTS: 9:43 pm: 3 Lasionycteris noctivagans 10:02 pm: 2 Eptesicus fuscus 10:03 pm: 6 Myotis spp.
Vermiculite Mountain/Rainy Creek - upper settling pond, near dam	UPPRAINY	Vermiculite Mountain, Upper Rainy Creek Pond Sam Martinez, 9/11/95 NO CALLS RECORDED.
West Fisher Creek - FS Rd 231	WFISHRCR	West Fisher Creek, FS RD 231 Sam Martinez, 9/10/95 NO CALLS RECORDED.
Zonolite Mine - adit area	ZONOLITE	Zonolite Mine on Vermiculite Mountain Sam Martinez, 9/11/95 NO CALLS RECORDED.



**APPENDIX II-A**  
**ENTRANCE/ANABAT SITE LOCATION DATA FOR**  
**PRYOR MOUNTAINS MINES RECLAMATION SITES**

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)							
			Operator	UTM	Elevation	PDOP	Lat	Long	Elevation	PDOP
CM&M Pit East (adit)	I-A-2	7/22/95	SJM	12 702563 T 4994435	6300	2.9	45° 4' 27.7"	108° 25' 35.7"	6300	2.9
		8/30/95	SJM	12 702558 T 4994420	5900	2.6	45° 4' 26.6"	108° 25' 36.0"	5900	2.6
CM&M West - (adit and shaft)	I-A-2	7/21/95	SJM	12 702099 T 4994664	6500	2.2	45° 4' 35.2"	108° 25' 56.5"	6500	2.2
Dandy Mine - West Upper, adit 4	I-A-2	7/21/95	SJM	12 701815 T 4994134	5900	3.7	45° 4' 19.2"	108° 26' 10.6"	5900	3.7
- West Upper, adit 5	I-A-2	7/21/95	SJM	12 701908 T 4994095	5900	3.8	45° 4' 17.5"	108° 26' 5.7"	5900	3.8
- West Upper, collapsed adit	I-A-2	7/21/95	SJM	12 702004 T 4994088	6400	2.4	45° 4' 16.9"	108° 26' 1.7"	6400	2.4
- West Upper, 2nd collapsed adit	I-A-2	7/21/95	SJM	12 702000 T 4994043	6200	2.1	45° 4' 15.4"	108° 26' 2.1"	6200	2.1
- West Lower, adit 6	I-A-2	7/21/95	SJM	12 701938 T 4993964	6100	2.6	45° 4' 13.0"	108° 26' 5.2"	6100	2.6
- East (adit)	I-A-2	8/30/95	SJM	12 702244 T 4994214	6300	2.1	45° 4' 20.9"	108° 25' 50.6"	6300	2.1
- Central (adits)	I-A-2	7/21/95	SJM	12 702060 T 4994203	5800	3.1	45° 4' 20.5"	108° 25' 59.5"	5800	3.1
- Southeast	I-A-2	9/24/95	SJM	12 702103 T 4994056	6000	3.0	45° 4' 15.8"	108° 25' 57.4"	6000	2.9
Lisbon Point - East (adit)	I-A-2	7/21/95	SJM	12 702719 T 4995065	7000	2.6	45° 4' 48.4"	108° 25' 27.4"	7000	2.6
- West (adit)	I-A-2	7/21/95	SJM	12 702572 T 4994951	6600	2.7	45° 4' 44.2"	108° 25' 34.2"	6600	2.7
Marie Mine (adit)	I-A-1	7/21/95	SJM	12 701672 T 4993791	5800	2.9	45° 4' 6.9"	108° 26' 17.8"	5800	2.9
Old Glory Mine (Ponderosa) - Upper north adit	I-A-3	8/29/95	SJM	12 701847 T 4997435	7800	3.1	45° 6' 6.1"	108° 26' 4.6"	7800	3.1
- Upper south adit	I-A-3	8/29/95	SJM	12 701847 T 4997435	7800	3.1	45° 6' 6.1"	108° 26' 4.6"	7800	3.1
- Lower north adit	I-A-3	8/29/95	SJM	12 701823 T 4997346	7600	3.5	45° 6' 3.9"	108° 26' 4.8"	7600	3.5
- Lower south adit	I-A-3	8/29/95	SJM	12 701891 T 4997397	7900	4.7	45° 6' 4.4"	108° 26' 3.2"	7900	4.7
Robert's Incline (adit)	I-A-1	9/25/95	SJM	12 702213 T 4993612	5800	3.2	45° 4' 1.5"	108° 25' 52.8"	5800	3.2

GPS Location Data (WGS-84)									
Site Name	Appendix I Map No.	Date	Operator	UTM	Elevation	PDOP	Lat	Long	PDOP
Sandra Mine - Main adit	I-A-3	7/21/95	SJM	12 702166 T 4996465	7700	2.4	45° 5' 34.1"	108° 25' 50.4"	2.4
-		8/29/95	SJM	12 702185 T 4996434	7600	2.7	45° 5' 32.8"	108° 25' 49.9"	2.7
- Northeast adit	I-A-3	7/21/95	SJM	12 702263 T 4996503	7600	4.0	45° 5' 34.8"	108° 25' 46.8"	4.0
- Prospect drill hole	I-A-3	7/21/95	SJM	12 702200 T 4996615	7600	3.6	45° 5' 39.1"	108° 25' 49.4"	3.6
Swamp Frog Mine - Northwest	I-A-4	8/30/95	SJM	12 701559 T 4991774	5700	5.8	45° 3' 2.5"	108° 26' 25.2"	5.8
- Central 1 (adit, New Year 1)	I-A-4	8/31/95	SJM	12 701903 T 4991492	5000	3.3	45° 2' 53.4"	108° 26' 9.7"	3.3
- Central 2 (New Year 2)	I-A-4	8/31/95	SJM	12 701930 T 4991714	5500	2.3	45° 3' 0.3"	108° 26' 8.2"	2.3
- Central 3	I-A-4	8/31/95	SJM	12 701834 T 4991702	5400	3.5	45° 3' 0.2"	108° 26' 12.7"	3.5
- South (New Year 5)	I-A-4	9/24/95	SJM	12 701993 T 4991228	5700	2.5	45° 2' 44.5"	108° 26' 6.5"	2.5
- East 1 (New Year 4)	I-A-4	9/24/95	SJM	12 702403 T 4990990	5300	3.2	45° 2' 36.7"	108° 25' 46.8"	3.2
- Southeast, adit 1	I-A-4	9/24/95	SJM	12 702567 T 4990852	5200	2.1	45° 2' 31.9"	108° 25' 40.8"	2.1
- Southeast, adit 2 (New Year 6)	I-A-4	9/24/95	SJM	12 702580 T 4990908	5100	2.1	45° 2' 32.7"	108° 25' 39.7"	2.1
- Southeast, adits 3 & 4 (New Year 6)	I-A-4	9/24/95	SJM	12 702521 T 4990915	5500	1.9	45° 2' 33.8"	108° 25' 44.2"	1.9
Locational Landmarks									
Marie Mine - claim post at drill hole	I-A-1	7/21/95	SJM	12 701561 T 4993902	6400	1.9	45° 4' 11.7"	108° 26' 22.4"	1.9
- cleft rock	I-A-1	7/21/95	SJM	12 701188 T 4992991	5600	2.2	45° 3' 42.6"	108° 26' 41.1"	2.3
- east cabin	I-A-1	7/21/95	SJM	12 701736 T 4993651	5700	3.3	45° 4' 3.4"	108° 26' 14.3"	3.3
- west cabin	I-A-1	7/21/95	SJM	12 701675 T 4993718	6400	2.9	45° 4' 5.3"	108° 26' 17.0"	3.0
Old Glory Mine (Ponderosa) - exploration pit	I-A-3	8/29/95	SJM	12 701863 T 4997045	7400	3.5	45° 5' 48.9"	108° 26' 4.7"	3.5

# **APPENDIX II-B** **ENTRANCE/ANABAT SITE LOCATION DATA FOR** **OTHER PRYOR MOUNTAINS SITES**

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)						
			Operator	UTM	Elevation	PDOP	Lat	Long	PDOP
Blackie Ice Cave	I-B-2	8/30/95	SJM	12 697912 T 5004939	8700	2.2	45° 10' 12.5"	108° 28' 52.8"	2.2
Big Ice Cave	I-B-1	7/23/95	SJM	12 704382 T 5004361	7700	3.2	45° 9' 46.3"	108° 23' 57.3"	5.1
							45° 9' 46.6"	108° 23' 57.4"	
Crater Ice Cave	I-B-2	7/22/95	SJM	12 698990 T 5004046	9000	1.9	45° 9' 42.5"	108° 28' 5.4"	1.9
		8/29/95	SJM	12 699026 T 5004026	8500	3.1	45° 9' 41.8"	108° 28' 3.8"	3.1
Demijohn Flats Catchment	I-A-1 I-A-4	8/31/95	SJM	12 703951 T 4994709	5600	3.3	45° 4' 35.3"	108° 24' 31.9"	3.3
Double Guzzler	I-A-4	8/31/95	SJM	12 703649 T 4992747	5600	3.4	45° 3' 32.1"	108° 24' 48.2"	3.4
Four-Eared Bat Cave	I-B-3	8/31/95	SJM	12 713712 T 4989435	4800	4.0	45° 1' 33.5"	108° 17' 14.5"	4.0
Frogg's Fault Cave	I-B-3	8/31/95	SJM	12 713002 T 4992925	6000	5.0	45° 3' 28.2"	108° 17' 41.0"	5.0
Gypsum Creek ½ mile below Gyp Springs	I-B-5	9/24/95	SJM	Unable to obtain enough satellites for a location.					
Gyp Springs	I-B-5	8/31/95	SJM	12 702487 T 4986936	4500	2.0	45° 0' 25.0"	108° 25' 47.1"	2.0
		9/24/95	SJM	12 702516 T 4986903	5000	4.5	45° 0' 24.9"	108° 25' 48.8"	4.7
Hilltop Catchment	I-A-4	9/25/95	SJM	12 702349 T 4989836	5200	3.6	45° 1' 59.5"	108° 25' 52.6"	2.7
Pond, spring and buildings near top of Red Pryor Mountain	I-A-3	7/21/95	SJM	12 700654 T 4998847	8200	2.9	45° 6' 52.5"	108° 26' 57.0"	2.9
Pryor Gap Railroad Tunnel - north end	I-B-6	8/29/95	SJM	12 700607 T 4998829	7900	2.4	45° 6' 52.2"	108° 25' 58.7"	2.4
		9/22/95	SJM	12 690313 T 5022199	5000	4.3	45° 19' 39.0"	108° 34' 17.7"	4.3
- south end	I-B-6	9/22/95	SJM	12 690267 T 5021968	4900	4.3	45° 19' 30.4"	108° 34' 19.5"	4.3
Red pond north of Old Glory Mine	I-A-3	8/29/95	SJM	12 701418 T 4997461	8100	3.6	45° 6' 6.7"	108° 26' 22.8"	3.7
Red pond near peak of Red Pryor Mountain	I-A-3	8/29/95	SJM	12 700682 T 4998982	8400	2.3	45° 6' 56.8"	108° 26' 55.2"	2.4
Sage Creek Campground	I-B-4	9/22/95	SJM	12 691663 T 5009840	6000	3.5	45° 12' 57.3"	108° 33' 32.3"	3.5

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)							
			Operator	UTM	Elevation	PDOP	Lat	Long	Elevation	PDOP
Sage Creek Cave	I-B-4	9/22/95	SJM	12 689075 T 5010652	5800	4.3	45° 13' 26.3"	108° 35' 30.2"	5800	4.4
Small pond on Dry Head Vista Road above Big Ice Cave	I-B-1	9/22/95	SJM	Unable to obtain enough satellites for a location.						
Unnamed blocked natural cave entrance downslope from the spring and building near the top of Red Pryor Mountain	I-A-3	7/22/95	SJM	12 700583 T 4998677	7800	3.0	45° 6' 46.7"	108° 26' 59.7"	7800	3.0
Unnamed cave sink	I-B-2	8/30/95	SJM	12 698246 T 5004424	8800	3.2	45° 9' 57.8"	108° 28' 38.5"	8800	3.2
Unnamed crawly holes above 4WD road	I-A-2	8/30/95	SJM	12 702083 T 4994360	6500	3.4	45° 4' 25.7"	108° 25' 57.0"	6500	3.4
Unnamed dead-end sinkhole near Crater Ice Cave, no.1	I-B-2	8/30/95	SJM	12 698975 T 5003989	9200	2.7	45° 9' 38.6"	108° 28' 10.9"	9200	2.7
Unnamed dead-end sinkhole near Crater Ice Cave, no.2	I-B-2	8/30/95	SJM	12 698781 T 5004058	9300	3.9	45° 9' 43.1"	108° 28' 14.4"	9300	3.9
Unnamed group of three dead-end sinkholes	I-B-2	8/30/95	SJM	12 697833 T 5004907	9400	3.3	45° 10' 11.6"	108° 28' 57.0"	9400	3.3
Unnamed huge dead-end sinkhole	I-B-2	8/30/95	SJM	12 697799 T 5004710	8600	3.6	45° 10' 5.1"	108° 28' 58.6"	8600	3.6
Unnamed large natural shelter cave	I-A-2	8/30/95	SJM	12 702675 T 4995004	6900	3.1	45° 4' 46.8"	108° 25' 29.0"	6900	3.1
Unnamed natural cave near CM&M East	I-A-2	8/30/95	SJM	12 702586 T 4994664	6500	2.9	45° 4' 35.1"	108° 25' 34.0"	6500	2.9
Unnamed natural tube cave up the mountain from Red Pryor Ice Cave	I-A-3	7/22/95	SJM	12 700598 T 4998649	8000	3.5	45° 6' 46.3"	108° 26' 59.1"	8000	3.5
Unnamed rock-lined sinkhole (possibly D-9 Cave)	I-B-2	8/30/95	SJM	12 698615 T 5004221	8500	2.7	45° 9' 48.5"	108° 28' 22.1"	8500	2.7
Unnamed rocky sinkhole	I-B-2	8/30/95	SJM	12 698256 T 5004158	8600	3.5	45° 9' 47.1"	108° 28' 38.3"	8600	3.5

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)							
			Operator	UTM	Elevation	PDOP	Lat	Long	Elevation	PDOP
Unnamed sharp-walled sinkhole	I-B-2	8/30/95	SJM	12 697987 T 5004562	8400	3.1	45° 10' 1.2"	108° 25' 49.2"	8400	3.1
Unnamed shelter cave at Lisbon Point ("Needle-Eye Cave")	I-A-2	8/30/95	SJM	12 702758 T 4994920	6800	3.3	45° 4' 43.2"	108° 36' 26.3"	6800	3.3
Unnamed shelter cave north of Sage Creek Road	I-B-7	9/22/95	SJM	12 688110 T 5011235	5200	3.8	45° 13' 46.1"	108° 36' 13.4"	5800	3.8
Unnamed sinkhole with small room next to the road on top of Red Pryor Mountain	I-B-2	7/22/95	SJM	12 698893 T 5003307	8900	3.5	45° 9' 18.9"	108° 28' 10.6"	8900	3.5
Unnamed small caves	I-B-7	8/30/95	SJM	12 702590 T 4994663	6800	4.2	45° 4' 33.3"	108° 25' 33.7"	6800	4.2
Unnamed small caves north of Sage Creek Road	I-B-7	9/22/95	SJM	12 686853 T 5011797	5700	3.4	45° 14' 5.7"	108° 37' 10.1"	5700	3.4
Landmark Locations										
Big Ice Cave Trailhead at parking lot	I-B-1	7/23/95	SJM	12 704250 T 5004217	7800	2.9	45° 9' 42.5"	108° 24' 4.7"	7800	2.9
Crater Bench Mark	I-B-2	8/30/95	SJM	12 698879 T 5003955	8900	3.2	45° 9' 39.6"	108° 28' 10.4"	8900	3.2
Lisbon Bench Mark	I-A-1 I-A-2	8/30/95	SJM	12 702679 T 4995006	6500	3.0	45° 4' 46.4"	108° 25' 29.9"	6500	3.0
Shriver Bench Mark	I-B-2	8/30/95	SJM	12 697640 T 5004941	8800	2.1	45° 10' 12.3"	108° 29' 7.6"	8800	2.1
Shriver Bench Mark No.1	I-B-2	8/30/95	SJM	12 697576 T 5004936	8600	2.9	45° 10' 12.9"	108° 29' 8.9"	8600	2.9
Shriver Bench Mark No.2	I-B-2	8/30/95	SJM	12 697647 T 5004937	8800	2.7	45° 10' 12.6"	108° 29' 5.6"	8800	2.7

**APPENDIX II-C**  
**ENTRANCE/ANABAT SITE LOCATION DATA FOR**  
**RED LODGE COAL FIELD MINE SITES**

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)							
			Operator	UTM	Elevation	PDOP	Lat	Long	Elevation	PDOP
Brophy No.2 Mine - conveyor adits	I-C-1	9/23/95	SJM	12 641651 T 5003407	5000	2.2	45° 10' 11.2"	109° 11' 49.2"	5000	2.2
- door frame, adit 4 (collapsed)	I-C-1	9/23/95	SJM	12 641930 T 5003421	4900	2.3	45° 10' 11.8"	109° 11' 37.5"	4900	2.3
- fan house adit	I-C-1	9/23/95	SJM	12 641742 T 5003381	4800	4.3	45° 10' 10.8"	109° 11' 46.6"	4800	4.3
Foster Gulch (at the mouth)	I-C-2	9/23/95	SJM	12 644829 T 5002312	4500	3.3	45° 9' 34.0"	109° 9' 26.9"	4500	3.3
Highway (Roadside) Mine	I-C-2	9/23/95	SJM	12 643586 T 5002177	4700	4.8	45° 9' 30.5"	109° 10' 23.1"	4700	4.8
Smith No.2 Mine - corral portal area	I-C-2	9/23/95	SJM	12 642576 T 5001641	4900	2.8	45° 9' 14.3"	109° 11' 9.8"	4900	2.8
Smith Prospect Adit	I-C-2	9/23/95	SJM	12 643044 T 5001903	5000	5.0	45° 9' 24.3"	109° 10' 48.4"	4900	5.0

**APPENDIX II-D**  
**ENTRANCE/ANABAT SITE LOCATION DATA FOR**  
**KOOTENAI NATIONAL FOREST SITES**

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)							
			Operator	UTM	Elevation	PDOP	Lat	Long	Elevation	PDOP
ASARCO - Park Creek tailings impoundment	I-D-1	9/9/95	SJM	11 584673 U 5351455	1700	4.0	48° 18' 38.7"	115° 51' 29.4"	1700	4.0
Big 8 Mine - north (upper) adit	I-D-2	9/9/95	SJM	11 574649 U 5365692	2-D	HDOP 2.2	48° 26' 24.2"	115° 59' 26.8"	2-D	HDOP 2.2
- south (creek) adit		9/10/95	SJM	11 574484 U 5365459	2800	4.6	48° 26' 16.6"	115° 59' 34.5"	2800	4.6
	I-D-2	9/9-10/95	SJM	Unable to obtain enough satellites for a location.						
Bull Lake - north end	I-D-3	9/9/95	SJM	11 584949 U 5346605	2200	3.0	48° 16' 1.2"	115° 51' 19.4"	2200	3.0
- south end	I-D-3	9/9/95	SJM	11 585798 U 5341558	2500	3.3	48° 13' 14.1"	115° 50' 42.3"	2500	3.3
Bull River Campground	I-D-4	9/8/95	SJM	11 586221 U 5320397	1500	5.0	48° 1' 51.3"	115° 50' 37.0"	1500	5.0
Bull River Guard Station	I-D-5	9/9/95	SJM	11 590688 U 5329248	2100	3.1	48° 6' 36.0"	115° 46' 54.6"	2100	
Cherry Creek Mill site	I-D-9	8/5/95	SJM	11 607774 U 5344539	3200	3.0	48° 14' 41.6"	115° 32' 53.9"	3200	3.0
Crescent Mine	I-D-6	9/9/95	SJM	11 581530 U 5360364	2-D	HDOP 2.2	48° 23' 29.2"	115° 53' 55.5"	2-D	HDOP 2.2
Double Mac Mine	I-D-7	8/4/95	SJM	11 601735 U 5350282	2-D	HDOP 2.1	48° 17' 49.9"	115° 37' 39.7"	2-D	HDOP 2.1
FS Road 231 above Montezuma and Standard Creek Mines	I-D-11	9/10/95	SJM	11 611538 U 5324404	4100	3.0	48° 3' 47.4"	115° 30' 10.5"	4100	3.0
Herbert Mine	I-D-8	8/4/95	SJM	11 604820 U 5354025	2-D	HDOP 2.4	48° 19' 50.6"	115° 35' 8.3"	2-D	HDOP 2.4
Libby Road (FS 231) at the junction with the Poker Hill Road	I-D-10	9/10/95	SJM	11 613450 U 5338652	3200	3.5	48° 11' 27.5"	115° 28' 24.4"	3200	3.5
Liberty Mine (mill and adit)	I-D-6	9/10/95	SJM	11 580158 U 5362212	2300	5.8	48° 24' 29.8"	115° 55' 1.4"	2600	5.7
Luken-Hazel Mine - II site (near sealed adit)	I-D-7	8/4/95	SJM	11 604100 U 5350991	2300	6.1	48° 18' 4.7"	115° 35' 46.3"	2900	HDOP 2.0
- large house ruin	I-D-7	8/4/95	SJM	11 604195 U 5350951	2800	3.7	48° 18' 12.8"	115° 35' 41.0"	2800	3.6
- lower mill site & building	I-D-7	8/4/95	SJM	11 604171 U 5351004	2700	7.3	48° 18' 13.0"	115° 35' 43.1"	2700	7.4
- outhouse pits	I-D-7	8/4/95	SJM	11 604215 U 5350956	3100	3.8	48° 18' 11.5"	115° 35' 41.2"	3100	3.9

Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)							
			Operator	UTM	Elevation	PDOP	Lat	Long	Elevation	PDOP
- structure ruins	I-D-7	8/4/95	SJM	11 604048 U 5351130	2900	3.4	48° 18' 17.5"	115° 35' 48.7"	2900	3.4
- upper mill foundations	I-D-7	8/4/95	SJM	11 604110 U 5351077	2900	5.7	48° 18' 14.8"	115° 35' 46.6"	2900	5.7
Midas Creek at FS 231 crossing	I-D-16	9/10/95	SJM	11 609909 U 5334092	3600	3.4	48° 9' 2.1"	115° 31' 20.2"	3600	3.4
Midas Mine	I-D-11	9/10/95	SJM	11 610870 U 5326382	4100	5.2	48° 4' 52.0"	115° 30' 41.1"	4100	5.2
Mitchell Creek Mine (adit)	I-D-12	9/11/95	SJM	11 611041 U 5363609	2000	3.7	48° 24' 56.8"	115° 29' 57.3"	2000	3.7
Mountain View Park from across the Kootenai River (near Stimson Lumber Co., Libby, MT)	I-D-12	8/3/95	SJM	11 609039 U 5360892	1800	2.5	48° 23' 30.2"	115° 31' 37.4"	1800	2.5
Saint Anthony Mine	I-D-13	9/11/95	SJM	11 602492 U 5364901	1900	4.5	48° 25' 44.7"	115° 36' 51.9"	1900	4.5
Saint Paul Mine - lower adit	I-D-19	8/6/95	SJM	11 601358 U 5340175	4100	4.0	48° 12' 24.1"	115° 38' 9.1"	4100	4.0
- upper adit	I-D-19	8/6/95	SJM	11 601422 U 5340181	4800	4.0	48° 12' 24.3"	115° 38' 5.9"	4800	4.0
Snowshoe Mine - lowest adit	I-D-19	8/5/95	SJM	11 600742 U 5340830	2-D	HDOP 4.3	48° 12' 41.9"	115° 38' 40.2"	2-D	HDOP 4.2
- west adit	I-D-19	8/5/95	SJM	11 600583 U 5339861	2-D	HDOP 1.9	48° 12' 14.2"	115° 38' 46.5"	2-D	HDOP 1.9
- east adit	I-D-19	8/5/95	SJM	11 600685 U 5338685	5100	5.7	48° 11' 35.5"	115° 38' 31.0"	5100	5.7
		8/5/95	SJM	11 602739 U 5339682	4900	5.3	48° 12' 8.6"	115° 38' 42.0"	4900	5.3
- highest open (breathing) adit	I-D-19	8/5/95	SJM	11 600691 U 5339656	6100	3.5	48° 12' 12.1"	115° 38' 41.5"	6100	3.5
Snowstorm Mine - at mine camp below adits	I-D-2	9/9/95	SJM	11 574791 U 5365155	2800	2.0	48° 26' 6.6"	115° 59' 19.7"	2800	2.0
Stimson Lumber Company settling ponds near Libby Creek	I-D-12	8/3/95	SJM	11 608268 U 5360543	2400	2.8	48° 23' 19.9"	115° 32' 15.1"	2400	2.8
Swamp Creek site	I-D-10	9/10/95	SJM	11 615848 U 5334051	2900	3.1	48° 8' 56.2"	115° 26' 33.3"	2900	3.1
Tombstone Mine (shaft)	I-D-17	9/11/95	SJM	11 621254 U 5358949	3000	2.9	48° 22' 19.1"	115° 21' 47.2"	3000	2.9
Troy, at highway rest stop/weigh station, 2 miles east of town	I-D-15	9/9/95	SJM	11 585032 U 5365407	2000	3.6	48° 26' 10.0"	115° 51' 0.6"	2000	3.5
Unnamed lake on Flower Creek	I-D-8	8/2/95	SJM	11 604857 U 5355419	2800	3.1	48° 20' 34.8"	115° 35' 5.3"	2800	3.0
Vermiculite Mountain/Rainy Creek - lower pond	I-D-14	9/11/95	SJM	11 616006 U 5365689	2800	3.6	48° 26' 1.7"	115° 25' 53.7"	2800	3.5
- upper pond	I-D-14	9/11/95	SJM	11 616284 U 5366770	2600	3.8	48° 26' 35.6"	115° 25' 38.8"	2600	3.8
West Fisher Creek site	I-D-18	9/10/95	SJM	11 617874 U 5323337	3500	3.4	48° 3' 8.6"	115° 25' 5.4"	3500	3.4



Site Name	Appendix I Map No.	Date	GPS Location Data (WGS-84)						
			Operator	UTM	Elevation	PDOP	Lat	Long	PDOP
Zonolite Mine	I-D-14	9/11/95	SJM	11 617313 U 5367449	3000	3.9	48° 27' 57.3"	115° 24' 48.9"	3.9
<b>Landmark Locations</b>									
One-lane bridge near the Luken-Hazel Mine lower mill site	I-D-7	8/5/95	SJM	11 603871 U 5350766	2600	4.0	48° 18' 4.9"	115° 35' 58.5"	4.2
Pioneer cabin ½ mile east of Double Mac Mine, at the front door	I-D-7	8/5/95	SJM	11 601985 U 5350032	3100	4.2	48° 17' 43.5"	115° 37' 28.7"	4.0

**TABLE FOR ASSISTING THE ASSEMBLY AND COMPOSITION OF THE MAP FIGURES**

Index	Map No.	Items Located by Labels
1	I-A-1	Marie Mine adit, claim post at drill hole, cleft rock, east cabin, west cabin; Robert's Incline; Demijohn Flats Catchment; Lisbon Bench Mark.
2	I-A-2	CM&M Pit East; CM&M West; Dandy west upper adit 4, adit 5, collapsed adit, 2nd collapsed adit; Dandy west lower adit 6; Dandy East; Dandy central; Dandy southeast; Lisbon east; Lisbon west; Unnamed crawly holes; Unnamed shelter cave at Lisbon Point ("Needle-Eye"); Lisbon Bench Mark.
3	I-A-3	Old Glory upper north, upper south, lower north, lower south, exploration pit; Sandra Mine main adit, northeast adit, prospect drill hole; Pond/Spring/Buildings atop Red Pryor Mountain; Red Pond North of Old Glory Mine; Red Pond near peak of Red Pryor Mountain; Unnamed blocked natural cave entrance near spring/pond/buildings; Unnamed large natural shelter cave; Unnamed natural cave near CM&M East; Unnamed natural tube cave above Red Pryor Ice Cave.
4	I-A-4	Swamp Frog Mine northwest, central 1, central 2, central 3, south, east 1, southeast adit 1, southeast adit 2, southeast adits 3 & 4; Demijohn Flats Catchment; Double Guzzler; Hilltop Catchment.
5	I-A-5	Wild Horse Sites.
6	I-B-1	Big Ice Cave; small pond on Dry Head Vista Road above Big Ice Cave; Big Ice Cave trailhead at parking lot.
7	I-B-2	Blackie Ice Cave; Crater Ice Cave; Unnamed cave sink; Unnamed dead-end sink near Crater Ice Cave No. 1, No.2; Unnamed group of three dead-end sinkholes; Unnamed huge dead-end sinkhole; Unnamed rock-lined sink (D-9); Unnamed rocky sinkhole; Unnamed sharp-walled sinkhole; Small sinkhole with small room next to the road on top of Red Pryor Mountain; Crater Bench Mark; Shriver Bench Mark; Shriver - No.1 Bench Mark; Shriver - No.2 Bench Mark.
8	I-B-3	Four-Eared Bat Cave; Frogg's Fault Cave.
9	I-B-4	Sage Creek Campground; Sage Creek Cave.
10	I-B-5	Gypsum Creek; Gyp Springs.
11	I-B-6	Pryor Gap railroad tunnel.
12	I-B-7	Unnamed shelter cave north of Sage Creek Road; Unnamed small caves; Unnamed small caves north of Sage Creek Road.
13	I-C-1	Brophy No.2 Mine; conveyor adits; fan house adit; door frame adit (adit 4).
14	I-C-2	Foster Gulch at mouth; Highway Mine; Smith No.2 corral portal; Smith Prospect adit.
15	I-D-1	ASARCO Park Creek impoundment.
16	I-D-2	Big 8 Mine upper adit, south adit; Snowstorm Mine camp.
17	I-D-3	Bull Lake north end, south end.
18	I-D-4	Bull River Campground.
19	I-D-5	Bull River Guard Station.
20	I-D-6	Crescent Mine; Liberty Mine.
21	I-D-7	Double Mac Mine; Luken-Hazel Mine II site, large house ruin, lower mill site/building, outhouse pits, structure ruins, upper mill foundations; One-lane bridge near Luken-Hazel Mine lower mill site; Pioneer cabin 1/2 mile east of Double Mac Mine.
22	I-D-8	Herbert Mine; Unnamed lake on Flower Creek.
23	I-D-9	Cherry Creek Mill site.
24	I-D-10	FS Road 231 at junction with Poker Hill Road; Swamp Creek site.
25	I-D-11	FS Road 231 above Montezuma Mine; Midas Mine.
26	I-D-12	Mitchell Creek Mine adit; Mountain View Park from across the Kootenai River; Stimson Lumber Company ponds.
27	I-D-13	Saint Anthony Mine.
28	I-D-14	Vermiculite Mountain/Rainy Creek lower pond, upper pond, Zonolite Mine adit.
29	I-D-15	Troy rest stop.
30	I-D-16	Midas Creek crossing on FS Road 231.
31	I-D-17	Tombstone Mine shaft.
32	I-D-18	West Fisher Creek site.
33	I-D-19	Saint Paul Mine lower adit, upper adit; Snowshoe Mine lowest adit, west adit, east adit, highest open adit.
34	I-D-20	Ravalli Mine adit.